

DEPARTMENT OF AGRICULTURE.

REPORT OF THE ACTING DIRECTOR OF AGRICULTURE FOR 1919.

THE Director of Agriculture proceeded on leave on November 10, 1919, and the Botanist and Mycologist assumed duties as Acting Director of Agriculture from that date.

Steps were taken during the year to bring into operation some of the extensions of the work of the Department proposed by the Director in 1918 in his scheme for the re-organization of the agricultural services of the Colony. The proposal to establish a farm school, &c., at Jaffna has been accepted, and the site has been selected. The staff of the Entomological Division was completed by the appointment of an Assistant Entomologist in June. Two Plant Pests Inspectors were appointed: one for the Central Division in July, and one for the Southern Division in December, and the training of Assistant Inspectors is in progress. An Economic Botanist was appointed in December.

In response to the memorandum of the Secretary of State for the Colonies on the subject of the development of the economic resources of the Colony, the Director of Agriculture drew up proposals for the furtherance of agricultural and botanical research in the Colony, which were submitted to the Committee appointed by Government to consider the question.

Owing to the absence of members of the staff on military service, and the shortage of staff in general, the work of the Department during the year has, on the whole, been necessarily limited to the continuance of permanent experiments, the routine advisory and administrative duties, and inquiries into problems of immediate importance.

RUBBER.

The rubber experiments instituted by the late Dr. Lock have now for the most part been brought to a conclusion and the results published. The question of further tapping experiments requires consideration; the area previously utilized at Gangaruwa cannot be taken into tapping again for several years, as future experiments on the same area are liable to be inconclusive owing to the effect of the previous differential tapping. Experiments on "change over" tapping, instituted in 1914 and 1915 respectively, were concluded in 1919, and an experiment on the relative yields obtained by a V and a single oblique cut begun in 1914 was closed at the end of the year. Another experiment on two- and three-day tapping was begun in January, 1919. The manurial experiments on rubber have been continued.

Rubber research under the joint Ceylon Rubber Research Scheme has been in abeyance, pending the formulation of proposals for further research by the different bodies interested. The accounts of the investigations carried out by Mr. L. E. Campbell, formerly Rubber Research Chemist, have been issued in book form.

Insect pests of rubber continue to be of minor importance. Some cases of trees killed by the stem borer, *Batocera rubus*, were recorded during the year.

Root diseases of rubber still give trouble, though their prevalence at the present time may be attributed in part to the incomplete methods adopted in the earlier period of thinning out. The chief interest in rubber diseases during the year centred in brown bast, which is now found to be prevalent throughout all the rubber districts. A census of trees affected by brown bast was taken by means of a schedule of queries circulated to estates through the various Planters' Associations. The returns indicate that the number of trees attacked is not as great as in some other rubber-producing countries, but it has not yet been possible to analyse them completely. It is now held that brown bast is a physiological result of tapping, and is more common in daily tapping than in alternate day tapping. It is scarcely possible to test that theory in Ceylon as, except in rare cases, the trees are tapped on alternate days. One important discovery during the year was the existence in Ceylon of the South Indian fruit disease and leaf fall, which has a more serious effect on the tree than the ordinary Ceylon disease of the same nature.

Rubber tapping in Ceylon may be said to have settled down, for the time, to alternate day tapping with a single oblique cut, either on one-half or on one-third circumference. Two cuts on a quarter, tapped on alternate days, is in vogue on some estates. Three-day tapping continues to give satisfaction to the estates which adopted it some years ago, but this method has not spread.

TEA.

General manuring of tea, which had been curtailed during the war owing to financial difficulties and the impossibility of obtaining certain manures, is now being resumed. It is generally considered that the bushes have not suffered by reason of this enforced reduction. In some districts, however, red rust was prevalent towards the end of the year, and as this is held to be primarily a disease which attacks weak bushes, it is possible that the effect of the omission of certain ingredients of the usual manure mixture may have been manifested in that way.

The tea manurial experiments at Peradeniya have been carried on under the revised programme approved by the Committee of Agricultural Experiments. The area under tea has been extended by the addition of two and a half acres formerly in old coconuts below the tea plots.

Several new root diseases of tea have been recorded during the year, the chief of these being another species of *Rosellinia*. The most important addition to the known diseases of tea is a leaf disease, which also attacks *Acacia decurrens*; at present this is not widespread, but it may be sufficiently serious to influence the practice of planting *Acacias* through tea.

Investigations on Shot-hole Borer (*Xyleborus fornicatus*) have been carried on by the Assistant Entomologist, in succession to Mr. E. R. Speyer, who resigned his appointment in February. Experiments with "paint" mixtures have been continued, and trap-crop experiments with castor are being instituted. The Plant Pests Inspectorate of the Central Division has been engaged chiefly on the inspection of estates and gardens for shot-hole borer in connection with the regulations governing the removal of tea stumps. From January 1, 1920, tea stumps cannot be removed from any infected estate.

Tea tortrix investigations were transferred to Maskeliya, where experiments were undertaken with control measures. This investigation was brought to a conclusion in June, and the results have been published in three bulletins. The chief recommendation for the control of this pest is the establishment of belts of trees as "flight breaks."

COCONUTS.

The manurial experiments on the Chilaw trial ground have been continued. At Anuradhapura coconuts on unirrigable land have made satisfactory progress.

The nut fall and leaf break diseases are still prevalent during the wet seasons in the Kurunegala District.

The black-headed coconut caterpillar was reported from the North-Western Province, where, however, it was found to be kept in control to some extent by a parasitic insect. In the Batticaloa District this caterpillar continues to be a serious pest.

OIL PALMS.

The West African oil palm is well established on the Experiment Station, Anuradhapura, where it is now fruiting freely. It has been proved that the locally grown seed germinates. Analyses of the fruits have been made by the Government Chemist.

CASTOR.

As noted in the report for 1918, castor was grown on forest clearings to the extent of 105 acres by the Forest Department in order to furnish a supply of oil for the Railway. Ten acres were also grown at the Experiment Station, Anuradhapura. Owing to difficulties in the matter of husking the seed, exact weights of the crop cannot be given, but up to date 2 tons 7 cwt. of oil have been obtained. The experiment is being continued this season at Iranaimadu and Vavuniya.

FIBRES.

Twenty-four acres of Sisal hemp and 5 acres of Mauritius hemp have been established at the Experiment Station, Anuradhapura.

FOOD PRODUCTS.

Experiments to determine the best time for planting paddy were begun at Anuradhapura, and varietal tests were continued at Peradeniya. The area under paddy at the Experiment Station, Peradeniya, has been extended. A large number of varieties of local paddy were collected and planted at both Experiment Stations to afford material for the Economic Botanist, who is devoting his attention to the improvement of paddy.

As in the last two years, an extensive distribution of seeds and cuttings of food plants has been made to meet the demands entailed by the food shortage. Four acres of el-wi were grown at Anuradhapura, and 6 acres at Peradeniya. Dhall, maize, sorghum, manioc, and sweet potatoes were grown to the extent of 16 acres at Peradeniya, where the area intended for the Economic Section is now cropped with foodstuffs, and smaller plots were cultivated at Anuradhapura. About 400 bushels of seed paddy have been distributed, and large numbers of cuttings of sweet potatoes and cassava. The Division of School Gardens provided 24,350 packets of vegetable seeds for home gardens, and 2,825 packets for school gardens, in addition to plants or cuttings of various kinds. 2,000 packets were distributed to members of Co-operative Credit Societies.

TOBACCO.

Tobacco experiments were continued at Jaffna and Teldeniya. The detailed report on the Jaffna crop is not yet to hand, but preliminary advices indicate that there is more prospect of a successful result with White Burley than with Turkish Tobacco. The Teldeniya crop is now being got ready for shipment. The Tobacco Adviser resigned his appointment at the expiration of one year, and the work is now being carried on by Mr. G. Harbord at Teldeniya and by Mr. W. P. A. Cooke at Jaffna. At the latter station the object for the current season is to obtain White Burley in sufficient quantity for a commercial trial, and with that in view seeds and plants have been distributed to local cultivators.

PLANT PESTS AND DISEASES INSPECTORATE.

A beginning with this new branch of the Department was made in July, when Mr. N. K. Jardine was appointed Inspector for the Central Division, with three Sub-Inspectors. Work in connection with the Shot-hole Borer regulations has been undertaken, and this has consisted chiefly of the examination of the numerous small tea gardens which exist in the Central Division, in order to determine whether the pest in question occurs in them. At present the work is confined to the entomological side, as, owing to the increased work of the Mycological Division and the lack of mycologists, it has not been possible to train the staff in the identification and treatment of diseases. Towards the end of the year Mr. C. H. Gadd arrived to take charge of the Southern Division.

BOTANIC GARDENS.

With the return of Mr. T. H. Parsons, Curator, Royal Botanic Gardens, Peradeniya, from military service in June, the Division of Botanic Gardens was able to work with a full staff. Special attention has been given to the nurseries, which have been extended and re-arranged, and lists of the plants available for sale have been published. Much work has been done in the arboretum, where many additions to the collections have been planted out during the year. The wood oil trees (*Aleurites* spp.) have been established and distributed to the Experiment Stations. Improvements have been made in the Economic Museum.

At Hakgala a number of plants have been added to the collections and many planted out. New plots of cinchona have been established. One of the camphor trees flowered during the year, and specimens have been forwarded to Kew for comparison with "camphor" trees of other countries which do not yield solid camphor. Experiments on the control of cutworm have been carried out.

At Henaratgoda experiments on the vegetative propagation of *Hevea* have been begun. Food crops were grown in the new rubber clearing. A school has now been opened in the Gardens by the Education Department, and a portion of the grounds has been set apart for demonstration gardens in connection with it.

The maintenance of the gardens attached to the residences of His Excellency the Governor and of the Colonial Secretary has been carried on as usual.

SCHOOL GARDENS.

The total number of registered school gardens is now 484, an increase of 33 over the previous year. Many more are awaiting registration, but cannot be taken in hand owing to want of funds to meet the cost of equipment and the lack of inspecting officers. The District School Committees have this year given substantial financial assistance towards the purchase of tools, &c. But owing to the enforced economy during the war, it has not been possible to maintain the equipment of school gardens in a satisfactory condition, and considerable expenditure is now necessary to put them on a proper footing.

Gate Mudaliyar A. E. Rajapakse kindly presented prizes to the best school gardens in the Negombo District, and Mr. M. B. Mapitigama, Ratamahatmaya, Paranakuru korale, a gold medal for the best school garden in his division.

Mr. C. Driberg, who has been associated with the School Garden Scheme since its inception, went on leave prior to retirement in November.

SCHOOL OF TROPICAL AGRICULTURE.

The Irene House property at Peradeniya has been purchased by Government, and plans are being prepared for the erection of the necessary school buildings there. The completion of these will abolish the makeshift arrangements to which the school has hitherto been subjected.

Twenty-six students, of thirty admitted to the two years' course in May, 1917, qualified for the school certificate in March, 1919; three of these have accepted Government scholarships for further training in India. Of the twenty students admitted in May, 1918, one withdrew in that year, and three in 1919, leaving a class of sixteen. Twenty-one were admitted in May, 1919, one of whom has been withdrawn. Twelve Sinhalese teachers were admitted to the vernacular course in January, 1919, and fourteen village headmen to the short course for headmen in May.

Three of the school staff have been transferred to posts in the Department of Agriculture. Sixteen passed students have been appointed as Agricultural Instructors, four are being trained as Sub-Inspectors of Plant Pests and Diseases, and one has been sent to India for special training in Entomology.

The school continues to do good work, and the majority of its passed students have proved satisfactory in their subsequent employment. With the greater facilities now in train, its usefulness may be expected to be still further increased.

CO-OPERATIVE CREDIT SOCIETIES.

Thirty new societies were registered during the year, bringing the total to 127. The movement has found its greatest support in the Western Province, where there are now 42 societies. The total membership of the societies is 15,160, and the paid-up capital Rs. 86,721.46. Government loans have been granted to the amount of Rs. 13,935.

The supply of manure through the societies is steadily increasing. In 1919 328 tons 16 cwt. of bone manure were supplied at a cost of Rs. 37,074.53. The absence of an adequate supply of bone manure and the high prices now ruling are tending to retard the expansion of this phase of the Societies' activities.

A conference of Co-operative Credit Societies was held in July, at which numerous subjects affecting the work were discussed.

EXPENDITURE.

The following is a statement of expenditure for the financial year 1918-19 :—

	Rs.	c.		Rs.	c.
Salaries ..	135,896	14	Agricultural Education :—		
Travelling ..	11,550	67	Salaries ..	8,544	20
Gardens—labour and upkeep :—			Travelling ..	785	15
Peradeniya Gardens ..	14,379	56	Lecturing fees ..	1,209	0
Hakgala ..	3,993	88	Incidental expenses ..	784	82
Henaratgoda ..	1,991	2	Catering for students ..	799	99
Nuwara Eliya ..	1,576	34	Rent for quarters ..	1,990	0
Queen's House Garden ..	1,369	82	Stationery ..	112	71
King's Pavilion ..	2,981	26	Laboratory expenses for School of		
Queen's Cottage ..	4,458	41	Tropical Agriculture ..	450	80
The Lodge Garden ..	428	70	Co-operative Credit Societies :—		
Cuddesdon Garden ..	523	62	Salaries ..	3,890	0
Temple Trees Garden ..	570	74	Travelling ..	1,679	31
Experiment Stations :—			Incidental expenses ..	35	57
Peradeniya ..	23,387	77	Stationery ..	66	6
Anuradhapura ..	10,775	98	Rubber Research :—		
Coconut Trial Ground, Chilaw ..	1,878	15	Investigation and research ..	6,239	25
School Gardens :—			Special Expenditure :—		
Labour and upkeep ..	4,766	58	Experimental cultivation of tobacco ..	7,929	19
Upkeep of Library, Laboratories, Herbarium ..	1,978	28	Seed distribution ..	1,205	35
Prevention of plant pests and diseases ..	2,515	51	Grants to shows and garden competitions ..	2,050	0
Incidental expenses ..	2,399	47			
Stationery ..	1,525	73			
Printed forms ..	253	47			
Local production of castor oil ..	2,664	45			
			Total ..	269,636	95

This expenditure may be itemized under the following sub-heads:—

	Rs.	c.
Administration	31,831	96
Scientific investigations, including expenditure on Rubber Research, Shot-hole Borer and Tea Tortrix Investigations	60,027	34
Experimental Stations, including special expenditure on tobacco cultivation and local production of castor oil	66,699	1
Botanic Gardens, including Gardens of Governor's and Colonial Secretary's residences	62,518	31
Agricultural Education (School of Tropical Agriculture, School Gardens, and Grants to Shows and Garden Competitions)	41,684	4
Co-operative Credit Societies	5,670	94
Seed distribution	1,205	35
Total	269,636	95

RECEIPTS.

The following receipts were collected during the year:—

	Rs.	c.
1. Head Office (Publications)	484	26
2. Royal Botanic Gardens, Peradeniya	1,858	22
3. Botanic Gardens, Hakgala	350	0
4. Botanic Gardens, Henaratgoda	1,034	41
5. Botanic Gardens, Nuwara Eliya	46	55
6. Experiment Station, Peradeniya	17,521	32
7. Experiment Station, Anuradhapura	974	84
8. Tobacco Trial Ground, Jaffna	1,766	45
9. School of Tropical Agriculture	3,022	50
10. Government Stock Garden, Peradeniya	47	46
Total	27,106	1

To this must be added the value of seeds and plants issued gratis to Government institutions from the following:—

	Rs.	c.
Peradeniya Gardens	866	19
Hakgala Gardens	474	80
Henaratgoda Gardens	24	15
Nuwara Eliya Gardens	30	0
Experiment Station, Peradeniya	131	11
Experiment Station, Anuradhapura	30	0
Government Stock Garden, Peradeniya	3,186	30
Total	4,742	55

COMMUNIQUÉ.

The following *communiqué* was made to the press on matters of agricultural importance and interest during the year:—Rubber Acreage Statistics, 1918–1919.

PUBLICATIONS.

The following publications were issued during the year:—

Annals of the Royal Botanic Gardens, Peradeniya, Vol. VII., Part I., July, 1919. Revisions of Ceylon Fungi, &c. By T. Petch.

Bulletins of the Department of Agriculture:—

No. 42.—The Effect of Time Intervals in Rubber Tapping, by T. Petch.

No. 43.—Shot-hole Borer (*Xyleborus formicatus* Eich.) Treatment of Prunings on Infected Estates, by E. R. Speyer.

No. 44.—Shot-hole Borer (*Xyleborus formicatus* Eich.): A Control Pruning Scheme and its Practical Modification by E. R. Speyer.

No. 45.—Tortrix Flight Breaks, by N. K. Jardine.

No. 46.—Field Experiments with Anti-Tortrix Fluids, by N. K. Jardine.

Leaflets:—

No. 12.—Brown Bast, by T. Petch.

No. 13.—Recommendations for the Control of Shot-hole Borer Beetle of Tea, by E. R. Speyer.

No. 14.—Cultivation of Foodstuffs.

STAFF CHANGES.

The following staff changes were made during the year:—

(1) Mr. F. A. Stockdale, Director of Agriculture, was on leave in England from November 10 to the end of the year.

(2) Mr. T. Petch, Botanist and Mycologist, acted as Acting Director of Agriculture during his absence.

(3) Mr. P. B. Herat assumed duties as Office Assistant to the Director of Agriculture on March 1.

(4) Mr. C. Drieberg, Superintendent, Low-country Products and School Gardens, was on leave from November 22 to the end of the year preparatory to retirement.

(5) Mr. G. Bryce returned from war service on November 10 and resumed duties as Assistant Botanist and Mycologist.

(6) Mr. M. K. Bamber, Government Chemist, returned from leave in England and resumed duties on December 16.

(7) Mr. J. C. Hutson assumed duties as Entomologist on January 7.

- (8) Mr. F. P. Jepson assumed duties as Assistant Entomologist on June 20.
 (9) Mr. G. Harbord returned from war service and resumed duties as Manager, Experiment Station, Peradeniya, on July 26.
 (10) Mr. W. B. Wilson, Tobacco Adviser, resigned his appointment on November 1, 1919.
 (11) Mr. N. K. Jardine assumed duties as Inspector of Plant Pests and Diseases (Central Division) on August 1.
 (12) Mr. C. H. Gadd assumed duties as Inspector for Plant Pests and Diseases (Southern Division) on December 16.
 (13) Mr. E. R. Speyer, Entomologist for investigation of Shot-hole Borer, resigned his appointment on February 25.
 (14) Mr. T. H. Parsons, Curator, Royal Botanic Gardens, Peradeniya, returned from war service and resumed duties on June 26.
 (15) Mr. H. A. Deutrom, Acting Manager, Experiment Station, Peradeniya, assumed duties as Manager, Dry Zone Experiment Station, Anuradhapura, on August 1.

The following appointments were made in the Clerical and Garden staffs of the Department :—
 Mr. C. Duff Tytler, Clerk, Head Office, with effect from February 1, *vice* Mr. J. Richardson, resigned.
 Mr. A. L. de Z. Jayatileke, Agricultural Instructor, Ceylon Agricultural Society, as Inspector of School Gardens, with effect from March 1. Mr. M. B. W. Palipana, Clerk, Head Office, with effect from June 9, *vice* Mr. U. B. Unambuwe, Clerk, School Gardens, transferred to Kandy Kachcheri. Mr. P. B. Kapuwatte, Clerk, Head Office, as Clerk, School Gardens, with effect from June 9. Mr. P. B. Keppitipola, Assistant Foreman, Stock Gardens, with effect from June 12. Mr. G. E. J. Hulugalle, Lecturer, School of Tropical Agriculture, as Acting Assistant Manager, Experiment Station, Peradeniya, with effect from September 1. Mr. C. H. Jayasinghe, Passed Student of the School of Tropical Agriculture, for training as Sub-Inspector, Plant Pests, with effect from September 9. Messrs. H. M. Rasnayaka and Z. M. Sally, Clerks, Head Office, with effect from October 1. Mr. D. A. W. Ranasinghe, Assistant Foreman, Royal Botanic Gardens, as Foreman, Government Gardens, Colombo, with effect from October 1. Mr. W. P. A. Cooke, Lecturer, School of Tropical Agriculture, as Acting Farm School Officer, Jaffna, with effect from October 1. Messrs. C. Kanagaratnam and C. Ragunathan, Lecturers, School of Tropical Agriculture (temporarily), with effect from October 13 and 14, respectively. Messrs. L. J. de S. Mihiripenne and K. M. Fernando, Clerks, Head Office, with effect from November 1.

T. PETCH,

Acting Director of Agriculture, and Registrar,
 Co-operative Credit Societies.

Peradeniya, March 24, 1920.

Annexures.

I.—REPORT ON THE WORK OF THE BOTANICAL AND MYCOLOGICAL DIVISION.

MYCOLOGY.

THE total number of in and out letters during the year was 3,236. Consignments of diseased plants for examination and report numbered 425, of which 202 were Hevea, 73 tea, and 15 coconut, the remainder including acacia, albizzia, amherstia, avocado, balsam, beans, brinjal, Brussel sprouts, cabbage, cacao, carrot, castor, casuarina, chillies, citrus, coffee, croton, cucurbits, dadap, dhall, dioscorea, eucalyptus, ficus, gliricidia, guava, hibiscus, hydrangea, ixora, jak, Madras thorn, mahogany, maize, mango, panax, paddy, pea, peach, pepper, plantain, plumeria, prosopis, rose, salvia, sapodilla, sorghum, sunflower, tephrosia, tobacco, tomato, violet, and miscellaneous garden plants.

Visits have been made to low-country estates during the year, chiefly to the Kelani Valley and Ratnapura Districts. The total number of miles travelled was 3,178, occupying 53 days. A lecture on brown bast was given to the Planters' Association.

The Botanist and Mycologist assumed duties as Acting Director of Agriculture in November on the departure of the Director of Agriculture on leave. Mr. G. Bryce, Assistant Botanist and Mycologist, returned from military service at the same time and assumed duties as Acting Botanist and Mycologist.

FUNGUS DISEASES.

Rubber.

Brown bast has been the chief disease of interest to the rubber planter during the last year. It is now held that this is a physiological effect, probably due to tapping. An account of the latest theories, together with observations on trees whose tapping history had been accurately recorded, was given in a lecture to the Planters' Association, and was published in the local press. A schedule of queries was issued, and replies were furnished from nearly all rubber estates, but it has not yet been possible to summarize these.

The root disease caused by *Fomes lignosus* continues to be prevalent, and fresh instances of extensive attacks are periodically reported. In some cases these are undoubtedly due to the thinning out, especially where the trees were cut off at ground level. Another frequent reason is failure to treat the first tree which died. It has now been found that stumps of the smooth dadap (*Erythrina lithosperma*) will serve as a starting point for this fungus, as well as the thorny dadap or "Bois immortelle" (*Erythrina umbrosa*) previously recorded.

All cases of root disease which present features differing from the typical appearances of the known root diseases are critically examined, and the cause determined when possible. In this way it has been found that *Fomes lignosus* in the drier zones, e.g., Kurunegala, may have quite a different appearance from that usual in the wetter districts. In these cases there is practically no external mycelium; the root when wet appears black, and, when the bark is removed, short white lines of mycelium are found embedded in the wood. Further cases of a root disease, probably due to a *Xylaria*, have been under observation. The fructification of brown root disease (*Fomes lamaensis*) has been fairly common during this year.

Owing to the continuous rains from July onwards, "bark rot" was prevalent during the latter half of the year. Fruit disease and leaf fall were had in some districts, but, on the whole, this disease was not as serious as in 1916. This is to be attributed to the fact that the rains began late, and, where the fruits were sufficiently advanced, the disease did not make rapid headway. The common *Phytophthora* on *Hevea* in Ceylon is *Phytophthora Faberi*, while in South India the only species known on *Hevea* is *Phytophthora Meadii*. During the last year *Phytophthora Meadii* has been found in one district in Ceylon, so that this country has two species of *Phytophthora* on *Hevea*. As far as observations have gone, the difference in the effect of the two species is very marked: during the leaf fall and pod disease caused by *Phytophthora Faberi* the flow of latex is not notably affected; but in attacks of *Phytophthora Meadii* the latex flow diminishes to such an extent that it is scarcely worth while to tap.

Three "decays of the renewing bark" may now be distinguished in Ceylon. These are (1) uniform patches caused by *Phytophthora Faberi*, often starting from the actual tapping cut and continuous with a typical claret-coloured patch in the untapped bark; these patches may develop a white covering of mycelium, and may then be mistaken for the "mouldy rot" of the Federated Malay States; (2) a decay which may originate as a spot and develop into black lines, or (?) may develop as a series of black lines from the beginning; this is the black thread of South India, caused by *Phytophthora Meadii*, usually a worse form than the other two; (3) a decay which begins as a series of parallel black lines shortly above the tapping cut, and spreads laterally to form a continuous band; this is the common Ceylon form of "black thread," and its cause is not yet decided. It is the third form which yields most readily to treatment with Brunolinum and stoppage of tapping. As far as is known at present, the distribution of *Phytophthora Meadii* in Ceylon is limited; curiously enough the locality known at present borders on a cacao district, where the prevalent *Phytophthora* should be *Phytophthora Faberi*. It would be of service in determining the distribution of *Phytophthora Meadii* if superintendents would report outbreaks of fruit disease on estates where "black thread" or "decay of renewing bark" is unusually serious and takes an irregular form.

Several cases were reported during the year in which a tree suddenly dried up, with all its leaves attached, as though killed by a root disease, though the trees were too large to be affected by a root disease in that manner. The leaves were usually curled up, and remained a peculiar pale green for a long time, instead of turning brown. On examination it was found that on a length of the main stem above the tapping surface, from a height of about 4 feet to 7 or 10 feet, the bark was dead, though outwardly it appeared quite sound and unbroken. Large beetle grubs were found beneath the decayed bark, in shallow cavities, about the size of a man's hand, eaten out of the outer layers of the wood, and from these cavities galleries had been bored into the stem. The death of the trees appeared to be due to the attacks of the grubs, which when hatched out by the Government Entomologist proved to be those of *Batocera rubus*, the stem and root borer of *Hevea* recorded by Green in 1912. The pest is consequently not a new one, but this effect on the trees has not been noted before.

Observations have been made on leaf diseases of *Hevea*. In the Dutch East Indies *Hevea* has been attacked by a true mildew (*Oidium*). On receipt of that information attempts were made to determine whether the mildews found on common Ceylon weeds which belong to the same order as *Hevea* would attack the rubber tree. Experiments were made with the mildew on *Euphorbia hirta* (*Bu-dadakiriya*) and *Phyllanthus Niruri* (*Pitawakka*), without any success; there is a mildew on the common hedge plant, *Jatropha Curcas* (*Rata-endaru*), which should also be tried, but this appears to be rare, and fresh specimens were not available at the time.

Some cases of "dieback," differing in some respects from the normal type, have come under notice during the year. In these the blackening and decay proceeds down the stem, not only along the cambium, but also in the outer layers of the bark, so that, in the early stages the bark is decayed on both surfaces, but does not show any evident signs of decay in the middle. Small oval patches of white mycelium, which turn gray when exposed and kept for a few days, are found on the surface of the wood, and these occur almost down to the advancing edge of the decay. It has been determined that the mycelium belongs to *Kretzschmaria micropus*, a fungus which has been known for some years to be saprophytic on dead *Hevea*, but infection experiments with this fungus have not yet been undertaken.

A peculiar form of scar on the main stem which has occurred for some years past on certain estates has been found, consequent on researches in Java, to be caused by lightning. It is also considered in Java that "top canker" is a lightning effect, but in any case injuries of the latter type should be treated to prevent the entry of fungi.

White stem blight, previously recorded as attacking tea, is now known to attack *Hevea*. It causes large white patches on the stem, which sometimes extend for a length of 6 feet, but it has not been determined that it causes damage to the stem. On tea and on teak it travels from the stem to the leaves, and on the latter forms white threads radiating from the base; on both plants the leaf is killed in a typical manner, the part covered by the fungus becoming pale yellow-brown, and contrasting strongly with the outer part of the leaf. It has not yet been found to attack the leaves of *Hevea*.

TEA.

Red rust was prevalent during the latter half of the year in the Ratnapura District and the Southern Province. As this disease is attributed to weakness of the bushes, it is open to consideration whether the shortage of manures is not beginning to show its effects in this way. In one case, however, where young tea was affected, the deciding factor was probably lack of drainage.

A *Rosellinia* root disease, which presented features differing from the disease caused by the usual species *Rosellinia arcuata*, was found to be due to *Rosellinia bunodes*. This fungus had previously been known to attack tea in India and *Hibiscus* in Ceylon. It differs from the usual *Rosellinia* in killing off the bush branch by branch, a single branch which arises low down on the stem dying, while the rest of the bush appears healthy. Typical *Rosellinia* mycelium is found at the base of the dead branch and on the main stem or root below it, and it would appear that in general an affected bush will ultimately die. Observations tend to show that the disease originates on dead leaves blown into the base of the bush, and that, in consequence, bushes which consist of branches arising from ground level are the more likely to be attacked. It has been found at elevations from 3,000 to 5,000 feet.

Further cases of root disease caused by *Poria hypobrunnea*, the rubber root *Poria*, have been recorded.

The principal new tea disease of the year is a leaf disease caused by *Cercospora theae*. This fungus was first recorded in 1909, when it occurred in an up-country nursery on tea plants about 6 inches high. It was not met with again until 1919, when it occurred under different conditions, and with more serious results. It is now known to attack both tea and *Acacia decurrens*, and recent attacks have occurred on tea interplanted with acacia. The disease appears during the rains. The acacias lose their leaves, and sometimes die back, though they may recover if dry weather sets in. The disease is communicated to the neighbouring tea by spores from the acacias, or by the infected leaflets of the acacias, which fall, or are blown, on to tea leaves, and, owing to their small size and flat surface, readily adhere when moist to the latter. In severe cases, or if the rains continue, the tea may be partly defoliated, and subsequently put out buds which do not develop far; in milder cases, or when the rains diminish, a large irregular spot, somewhat resembling gray blight, results; while in less serious attacks circular spots, resembling the bird's eye spot, but rather larger, are produced. Whether this is serious enough to affect the policy of planting acacias through tea has not yet been decided; it will depend largely on the individual case.

COCONUTS.

The *Phytophthora* nut fall of coconuts showed little or no improvement during the year. Advice from the Philippines indicate that this *Phytophthora* may be identical with the rubber and cacao *Phytophthora*, *Phytophthora Faberi*.

Further field observations were made on the leaf break, but it has not been possible to carry out detailed laboratory investigations.

Towards the end of the year a disease of coconuts characterized by a "tapering of the crown" was reported. This is considered to be due to a root disease, but it has not yet been determined whether it is the root disease of coconuts already known (*Fomes lucidus*), or a new one.

GREEN MANURES.

An investigation of the fungi which occur on dadaps was begun. The occurrence of *Fomes lignosus* on dadap stumps has been referred to above. *Poria hypobrunnea* was found on dying dadaps grown through tea on one estate. The occurrence of *Cercospora theae* on *Acacia decurrens* may modify the practice of planting acacias through tea.

FOOD CROPS.

Beans (*Phaseolus* sp.) have been attacked in some cases by *Colletotrichum Lindemuthianum* Bri. & Cav., *Cercospora cruenta* Sacc., and *Pseudomonas Phaseoli* Sm. *Rhizoctonia* sp. was found on Lima beans as a root or collar disease; it is said to be common in one district.

Cerebella Sorghi Tracy & Earle was recorded on sorghum.

A sclerotial disease, differing in some respects from the one previously known to occur in Ceylon was found on paddy.

Brussel sprouts, knol-kohl, and cabbage were attacked by *Pseudomonas campestris* Sm.

MISCELLANEOUS.

Pink disease (*Corticium salmonicolor* B. & Br.) was found on *Amherstia nobilis* Wall., *Gliricidia maculata* HBK., Loquat (*Photinia japonica* Lindl.), Madras thorn (*Pithecolobium dulce* Benth.), and *Randia macrantha* DC.

The "damping off" of tobacco seedlings was found to be caused by *Phytophthora Nicotianae* Rac.

Botryodiplodia Theobromae Pat. was found to cause a root disease of *Grevillea robusta* Cunn. and *Fomes applanatus* Pers., a root disease of *Cola acuminata* R.Br.

Dry rot in a mud and wattle wall in a low-country bungalow was determined to be due to *Merulius similis* B. & Br. The dry rot of similar structures in up-country bungalows is caused by *Merulius polychromus* Petch.

Corticium (Hypochnus) sp., apparently identical with that which causes black rot of tea, was found to attack Madras thorn (*Pithecolobium dulce* Benth.).

Other new diseases recorded during the year include *Bacillus Solanacearum* Sm. on chillies; *Rhizoctonia* sp. on barley; *Gloeosporium* sp. on balsam; *Oidium* sp. on *Peucedanum graveolens* Benth.; *Oidium* sp. on *Sechium edule* Sw. (chocho); *Pestalozzia Mangiferae* P.Henn. on mango; *Asterostomella Aberia* n. sp., on *Aberia Gardneri* Clos (Ceylon gooseberry); *Cercospora Musae* Zimm. on plantain.

BOTANY.

430 specimens of flowering plants, &c., have been received for identification. A feature of this work during the year has been the number of specimens of timbers, seeds, and plants of possible economic value which have been submitted for identification by Colombo firms. Mr. F. Lewis contributed to the Herbarium over 200 specimens collected at Delgoda, an almost inaccessible district in the south-west.

Investigations were begun into the identity of the species grown as turmeric in Ceylon. The common Ceylon kaha is *Curcuma domestica* Val., but there appear to be other species also grown under the same native name.

Mr. H. L. van Buuren, investigating the species known as atiudayan in Ceylon, has found that in the Kandy District that name is applied to a *Cryptocoryne*. Atiudayan is one of the Ceylon medicinal plants.

WEEDS.

No new weeds have been recorded during the year. *Alavankai pullu* has been identified as *Erigeron sumatrensis* Retz.

The water hyacinth continues to re-appear in old localities, no doubt from seed, the dormant period of the seeds being a prolonged one. It occurs, as a rule, in small quantities in the Kandy, Rambukkana, and Polgahawela districts, and these are cleared up without much difficulty. In the Tangalla district, however, it is present on a large scale, and special attention will have to be given to that area.

Mikania scandens is now prominent in most parts of the Island up to an elevation of 4,000 feet. At Peradeniya it is attacked by dodder (*Cuscuta chinensis*).

PUBLICATIONS.

One number of the annals of the Royal Botanic Gardens was published during the year, containing the following papers:—

Revisions of Ceylon Fungi, Part VI: a re-description of fifty-eight species of Ceylon Fungi.

A new variety of *Exacum zeylanicum*: a description of a variety collected by Mr. F. Lewis.

Oxalis in Ceylon: a history of the weeds hitherto known as *Oxalis violacea*.

Alocasia indica: a discussion of the reputed occurrence of this plant in Ceylon.

Gasteromycece zeylanicæ: a descriptive list of the puff balls, &c., of Ceylon.

A Bulletin was published on "The Effect of Time Intervals in Rubber Tapping," and a leaflet on "Brown Bast."

Peradeniya, March, 1920.

T. PETCH,
Botanist and Mycologist.

II.—REPORT ON THE WORK OF THE ENTOMOLOGICAL DIVISION.

REPORT OF THE ENTOMOLOGIST.

THE Entomologist assumed duties on January 7, 1919, taking over from Mr. E. R. Speyer, who had been Acting Entomologist, in addition to his special duties as Entomologist for shot-hole borer. After Mr. Speyer's resignation on February 25, the shot-hole borer investigation was carried on by the writer until the arrival of Mr. F. P. Jepson as Assistant Entomologist towards the end of June. Mr. G. M. Henry, who had been acting as Assistant Entomologist, returned to the Colombo Museum.

During the year special attention has been paid to the insect collection, which has been thoroughly overhauled. The whole collection of pinned insects, including both the general collection and the numbered economic specimens, is now housed in air-tight boxes, and most of this work was carried out by the Acting Assistant Entomologist and the Laboratory Assistant under the supervision of the Entomologist. No general collecting on a large scale can be attempted at present owing to the lack of storage facilities, but the numbered economic collection is being increased by the accession of past specimens. The alcoholic material, consisting mainly of the immature stages of various insects, is also being added to, and requires constant attention.

The collection of slide mounts of various minute insects has hardly been increased during the year owing to the lack of apparatus for this work, but it is hoped that this deficiency will be remedied to some extent during the coming year, so that this important branch of an insect collection may be suitably maintained.

The card index notes of economic insects are now being kept on standard size paper slips and cards, and the back files have been "standardized." Cross reference files are being prepared to facilitate future references.

A modern binocular microscope is an indispensable part of the equipment of an up-to-date entomological laboratory, and one of these instruments is expected at an early date. Correspondence and routine laboratory work take up a large portion of the Entomologist's time, and during the period under review 856 in and out letters have been dealt with. Consignments of specimens totalled 125 during the year, and included insect pests from tea, rubber, cacao, coconuts, rice, cotton, citrus, and vegetable crops, in addition to insects of minor importance.

Visits have been paid to estates in the following districts:—Kadugannawa (three times), Nuwara Eliya (three times), Halgranoia (twice), Kelani Valley (twice), Nilambe (twice), Uda Pussellawa, Maskeliya, Dimbula, Walapane Lower, Négombo, Marawila, and Kalutara once each. Hakgala Gardens has been visited three times, chiefly in connection with cutworm experiments.

The Entomologist has attended all the meetings of the Committee of Agricultural Experiments at Peradeniya during 1919.

I desire to express my thanks to Dr. Guy A. K. Marshall, Director, Imperial Bureau of Entomology, for kind assistance in the identification of specimens, and to the Director, Colombo Museum, for the generous loan of a binocular microscope over a period of several months.

FUMIGATORIUM.

During the year 598 cases of tea seed, 88 cases of citrus fruits, and 471 packages of plants have been treated at the fumigatorium. Certain alterations and additions are shortly to be made to the fumigatorium, by which it is expected that the speed and efficiency of the work will be increased. The Entomologist paid five visits to the fumigatorium during 1919.

A small fumigation chamber has been erected in the Royal Botanic Gardens at Peradeniya.

MAJOR PESTS.

Shot-hole borer (*Xyleborus fornicatus* Eich.) is now widely distributed throughout the greater portion of the area under tea, and has been a bad pest in some districts. The register of infested areas is being added to daily by the recently established Plant Pests Inspectorate. Mr. E. R. Speyer, before his departure in March, formulated a Soap-rosin-fish-oil "paint" mixture, and directions for the manufacture and application of this insecticide were given by him in Leaflet No. 13 published by the Department. Until the arrival of the Assistant Entomologist in June the shot-hole borer investigation was carried on by the Entomologist, and estates were visited or suggestions were given in connection with the trial of the mixture. The report of the Assistant Entomologist, who has charge of the shot-hole borer investigation, is given below.

Tea tortrix (*Homona coffearia*) continues to be prevalent in some districts, and an outbreak occurred towards the end of the year in one of the up-country districts on an estate from which it had not previously been reported. The special tea tortrix investigation conducted by Mr. N. K. Jardine was concluded in June.

Fluted Scale (*Icerya purchasi*).—The pest was reported to be prevalent on species of acacia on a few up-country estates during the dry weather of the first three months of the year. This scale is usually controlled during the wet season by fungi, chiefly *Cephalosporium* and *Melanospora*. Four consignments of Vedalia beetles (*Novius cardinalis*) were received from South Africa during 1919, but in no instance did any of the insects arrive in a living condition. Further shipments of this beetle are expected shortly, and given living material, an attempt will be made to breed the beetles at this elevation (1,600 feet) before sending them up to the higher elevations (3,000–5,000 feet). One colony of another predacious beetle (*Rodolia iceryæ*) was also received, but all the insects were dead. Since the above was written, a consignment of living Vedalia material has been received.

Cutworms (*Agrotis* spp.) are pests of vegetable crops in some up-country districts, and control experiments against these insects have been carried on during several months of the year. A small Andres-Maire bait trap for the moths has been kept going at Hakgala for the last six months, but has not been a success so far.

Trials with poisoned bait against the caterpillars have also been made, but the long spell of wet weather has interfered with these experiments, and a large percentage of the young plants suffered from “damping off.” These experiments will be continued in 1920.

Outbreaks of the swarming paddy cutworm (*Spodoptera mauritia*) occurred towards the end of the year in several localities of the Kalutara District, and in all several hundred acres of paddy were more or less damaged. Control methods include clean cultivation in and around the fields to prevent egg-laying there, flooding the fields and collecting the caterpillars by means of winnows, keeping the embankments well plastered with mud to prevent caterpillars from pupating there, and to hinder the emergence of moths.

Flooding and kerosining was tried with a certain amount of success, but the cost is prohibitive for small growers. It was noticed that several species of birds, especially crows, were eagerly devouring the caterpillars on the embankments, and these are an important factor in the control of the pest. Towards the end of the outbreaks the cocoons of a small Braconid parasite were much in evidence.

Termites (probably *Calotermes militaris*) have been prevalent during the year on several tea estates at different elevations. They attack small flushing tea bushes as well as the larger seed bearers, working mainly in the less vital portions of a bush.

An infested bush may continue to grow vigorously for some time, even though the frame is riddled, and the main stem may be a mere shell. In the case of seed bearers, the termites apparently enter the bush fairly high up, usually where a branch has been broken off, or at some other point of injury, and then work downwards into the main stem, and sometimes even into the roots. Badly infested seed bearers often die back at the top. Remedial measures include the pruning of all dead wood, the trimming of all broken ends, and the tarring of all cut ends. Field experiments are being made with injections of carbon bisulphide, with promising results; but further trials are needed along this line before any definite information can be given about this treatment.

The snail (*Achatina fulica*) has been a serious pest in some districts during the wet months of the year. Its rapid increase in localities hitherto free from this pest and its partiality for many crops of economic importance are causing apprehension in several districts. Experiments have been made on a small scale with contact sprays, and solutions of alum and of copper sulphate in water have given promising results, but the cost is prohibitive for use on a large scale. The continuous and systematic collection and destruction of the snails during the wet season and the clearing up of all rank vegetation in and around vegetable gardens are measures that will help to reduce the numbers of this pest.

The coconut caterpillar (*Nephantis serinopa*) continues to be prevalent in the Eastern Province, while periodic outbreaks occur in the North-Western Province. One of these attacks was reported in August, and was investigated on two estates by the Entomologist. A species of small hymenopterous parasite is an important factor in the control of this pest in the latter district. Where quite young trees are attacked, the outbreak can be checked in its early stages by collecting and destroying the caterpillars on the leaves. The burning of tar and sulphur “smudge” fires is employed with good effect in the Eastern Province, and trap-lights to catch the egg-laying females have also been tried, with some success, in that district. In the case of a bad attack on old trees, the removal and burning of the infested leaves will destroy all eggs, caterpillars, and cocoons present at the time. This should be done carefully, as the red weevil is always ready to take advantage of any injury to the trees. A system of good cultivation and manuring is recommended to keep the trees in vigorous health.

SOME MINOR PESTS.

Tea.

Zeuzera coffeæ (red borer) was reported from some half a dozen estates both in up-country and low-country districts.

Nettle Grub.—An outbreak of *Spatulifimbria castaneiceps* occurred on an up-country estate. This is one of the less common species.

Saissetia hemisphærica (“brown bug”) was reported on two occasions, one outbreak damaging about 10 acres of young tea.

Specimens of *Oscinis theæ* (leaf miner) were received from three estates. A sudden outbreak of *Gracillaria theivora* (leaf roller) occurred on an up-country estate, but was soon controlled by plucking and by the heavy rains.

Nematode or “eel worm” (*Heterodera radicolica*) was reported on old tea bushes on an up-country estate. Investigations showed a heavy infestation within a well-defined area, which has been isolated by trenches; all the dead and dying bushes have been removed, while the infested area has been heavily limed.

The following insects have also been reported or observed to be injuring tea:—*Coccus viridis*, *Helopeltis antonii*, *Ricania fenestrata*, *Ricanoptera opaca*, *Orgyia postica*, *Heterusia cingala*, *Lepidiota pinguis*.

The grubs of *Lepidiota* feed on the roots.

Rubber.

Several large Cerambycid grubs were received in a Hevea log, and were allowed to develop into beetles, which proved to be *Batocera rubus*, or very near it.

Specimens of *Saissetia nigra* were received on leaves of Para rubber.

The leaves of *Funtumia elastica* at Peradeniya were badly attacked by the caterpillars of *Caprinia conchylalis*.

Cacao.

Very few reports have been received of any pests of cacao during 1919. The brown bark borer (*Arbela quadrinotata*) has been observed, and helopeltis has been a pest on one or two estates.

The aphid, *Toxoptera aurantiae*, was common at Peradeniya on young leaves and pods during the early months of the year. It is preyed upon by Chrysopid and Syrphid larvæ.

Coconut.

In addition to the coconut caterpillar, the red weevil (*Rhynchophorus ferrugineus*) has been reported or observed on the western coast. This pest and the rhinoceros beetle (*Oryctes rhinoceros*) probably occur in most of the coconut districts.

The scale insects *Aspidiotus destructor* and *Ischnaspis longirostris* have also been observed.

Rice.

Several reports of rice caterpillars have been received during the year, and specimens of the following have been sent in:—Stem borer (*Schoneobius bipunctifer*); leaf-folding caterpillars of *Cnaphalocrocis medinalis* and *Marasmia bilinealis*; the case-bearer *Nymphula depunctalis*. The paddy fly (*Leptocoris acuta*) was also reported to be prevalent in one locality.

Cotton.

The leaf folder (*Sylepta mutilinealis*) was reported from one estate, and was also observed at Peradeniya.

Specimens of red bugs (*Dysdercus cingulatus*) were received from one estate.

Leguminous Plants.

Dadap (*Erythrina lithosperma*).—Specimens of the tussock moth caterpillar (*Orgyia postica*) have been sent in from three different estates as attacking this green manure plant. An outbreak of large caterpillars was reported from another estate, and specimens bred out proved to be the Lasiocampid, *Taragama dorsalis*. The stem borer (*Terastia meticulosalis*) has been received on two occasions. The large Coreid bug (*Anoplocnemis phasiana*) is usually to be found on dadap in small numbers, but sudden outbreaks of this insect were reported from two up-country estates during the year.

Acacia spp.—In addition to the fluted scale (*Icerya purchasi*), which attacks several species of acacia, the following insects have been reported or observed to be feeding on the leaves:—The beetles *Mylocerus curvicornis*, *Astycus immunis*, *Popillia complanata*, *Lepidiota pinguis*, and the Tortrix (*Homona coffearia*).

Tephrosia candida.—The small beetle (*Aræcerus fasciculatus*) has been reported as damaging the pods of this plant. The eggs are inserted into the pods, and the grubs bore into the seeds and later pupate within the pod. Usually the older pods are attacked, and infested pods should be picked and burnt. The grubs of this beetle have also been found at Peradeniya infesting other species of *Tephrosia* and species of *Crotalaria*, *Indigofera*, *Bauhinia*, and *Cajanus indicus*. Other insects observed attacking this plant at Peradeniya include the following:—*Euproctis scintillans*, whose caterpillars eat the flowers and damage the developing pods; *Maruca testulalis*, whose caterpillars bore into the pods and eat the young seeds (this pest also attacks *Cajanus indicus* and various species of beans); and the Coreid bugs *Riptortus pedestris* and *R. fuscus*, which breed on this plant, among others.

Cajanus indicus, when in bearing, seems to be the favourite host plant for a varied collection of insects. In addition to the two mentioned above, the following have been observed attacking this crop at Peradeniya:—The Membracids *Leptocentrus* sp. and *Gargara* sp., the Pentatomids *Nezara viridula*, *Cyclopelta siccifolia* (clustering on the stems), *Brachyplatys cingalensis*, *Coptosoma cribrarium*, *C. siamicum*, all of which are also found on beans; the caterpillars of the Lycænid, *Lampides bochus*, which bore into the flower buds and later feed on the pods; an *Agromyza* sp., the larvæ of which bore into the seeds and pupate inside the pods; and the Meloid beetle (*Mylabris pustulatus*), which devours the blossoms.

Indigofera arrecta, besides being attacked by most of the bugs mentioned above, is sometimes visited by the Pentatomids *Halyomorpha picus*, *Piezodorus rubrofasciatus*, *Eusarcocoris guttiger*, and *Tolumnia immaculata*.

Sweet Potato.

The following insects were reported or observed to be attacking *Ipomoea batatas* during the year:—The weevil (*Cylas formicarius*) was prevalent during the early months of the year. Four different species of tortoise beetles (Cassidæ) were found eating the leaves in both the larval and adult stages, among these were *Aspidomorpha miliaris* and *A. micans*. The Pyralid (*Tabidia aculealis*) is usually to be found folding and eating a portion of the leaves.

Miscellaneous Pests.

A large number of insects have been reported or observed to be feeding on various plants during the year, but it is only possible to mention a few of those which damage plants of economic importance.

Brassica oleracea vars.—Cabbage and Brussels sprouts were attacked by the caterpillars of *Plutella maculipennis*, Chinese cabbage by the caterpillars of *Crociodolomia binotalis*, and knol-khol by the Pentatomid bug *Bagrada picta*. The leaves of *Bactrocera* (*Dacus*) *cucurbitæ* were found attacking cho-cho (*Sechium edule*). Specimens of *Dorylus orientalis* were received from two up-country estates as damaging potato (*Solanum tuberosum*). This ant perforates the tubers and renders them unfit for use. A jak tree (*Artocarpus integrifolia*) at Peradeniya was attacked by the larvæ of a large Cerambycid beetle, which could not be distinguished from *Batocera rubus*.

J. C. HUTSON,
Entomologist.

THE TEA SHOT-HOLE BORER INVESTIGATION.

THIS investigation has been taken over by the Assistant Entomologist, who assumed duty on June 23. Attention has been chiefly directed to inquiries regarding the merits of the special "paint mixture" advocated for use against this pest by Mr. E. R. Speyer, who formerly conducted this investigation.

Itinerary.—Twenty-one visits to estates have been made in the following districts :—Badulla, Dimbula, Hantane, Haputale, Kadugannawa, Kelani Valley, Nilambe, and Walapane Lower.

Paint Mixture.—The application of the soap-rosin-fish-oil emulsion to bushes immediately after pruning has now been made over an experimental area of 161½ acres on eight separate estates. The average cost of treatment per acre, calculated from figures so far received from five of these estates, is Rs. 30·51. Apart from the excessively high cost of treatment, it appears, from observations recently made, that the treatment is not as efficacious as originally anticipated. Further trials are being carried out, from which definite information will be available.

Castor as a Trap Tree.—An area of 24 acres of tea has been interplanted with castor at distances apart varying from 12 feet by 9 feet to 36 feet by 36 feet, the object being to ascertain whether the tea in this area is provided with any degree of immunity by the attraction of the borer to the adjacent and more attractive castor.

Control Pruning.—An attempt to control the reproduction of the borer by means of the periodical removal of infested branches has been commenced over the entire area of one estate, and this method of control offers considerable promise of success if systematically and thoroughly carried out.

Laboratory Work.—Laboratory work has been confined to the examinations of the samples of branches treated with the "paint mixture" referred to above, dieback branches, and specimens of beetles received for identification. A few experiments in connection with the life-history and habits of this pest have also been undertaken.

Shot-hole Borer Register.—Examinations of prunings and specimens conducted in this office have resulted in twenty-two additional estates being declared infested and added to the Shot-hole Borer Register.

Correspondence and Inquiries.—During the six months under review 348 letters have been dealt with by the Assistant Entomologist, chiefly in direct connection with this investigation. Of this number, 164 were received and 184 despatched. Samples received for examination number 27, and other inquiries were received from nine sources.

March, 1920.

F. P. JEPSON,
Assistant Entomologist.

TORTRIX INVESTIGATION.

IN December, 1918, the tortrix investigation moved to Maskeliya, in order to conduct field experiments with anti-tortrix fluids. These experiments were successfully completed in June of the following year, and their details published in a bulletin of the Department (No. 46) in November.

A previous bulletin (No. 45), treating with the subject of flight breaks, was published in September of the same year.

Bulletin 40, published in November, 1918, gives all biological details of the insect and its natural enemies, and recommends certain remedial measures.

Bulletin 45 emphasizes the necessity of every estate possessing a series of flight breaks, whereby the area open to attack by the pest is reduced to the minimum, and artificial remedial measures become practicable and economical; it also points out that only by a system of these breaks does an estate gain protection from subsequent attacks.

Bulletin 46 completes the investigation by supplying to planters details of fluids that may be used freely on attacked tea to kill the insect.

On the satisfactory termination of the experiments with anti-tortrix fluids the tortrix investigation was closed, and all details of the work handed over to the Government Entomologist in July.

The Investigator was appointed Plant Pests and Diseases Inspector for the Central Division.

January 17, 1920.

NIGEL K. JARDINE,
Entomologist for Tea Tortrix.

PLANT PESTS AND DISEASES INSPECTORATE (CENTRAL).

THE Plant Pests and Diseases Inspectorate commenced its functions in August with one Inspector and three Sub-Inspectors. Its first duties have been—

- (1) To make a preliminary survey of tea gardens to ascertain if shot-hole borer (*Xyleborus fornicatus* Eich.) be present, and, if so, to gazette the gardens as infested areas.
- (2) While performing these duties, to get into touch with the Ratamahatmayas of the districts, the Korals, and the Arachchis, and explain to them the objects of the Inspectorate, with a view to the future education of growers in the pests and diseases affecting their crops.
- (3) To inspect estates.
- (4) To ascertain that no plants were being sold without permits.

Since August, 1919, 31 estates and 336 gardens have been inspected, 67 permits for sale of plants have been issued by the Department, comprising a total of 711,050 plants. Twenty estates and 237 gardens have been gazetted as infested areas for shot-hole borer, and two estates removed from the Shot-hole Borer and Fluted Scale Registers.

One prosecution for selling plants without a permit has been taken in hand.

January 17, 1920.

NIGEL K. JARDINE,
Inspector for Plant Pests and Diseases, Central.

III.—REPORT ON THE WORK OF THE CHEMICAL DIVISION.

DURING my absence from Ceylon on leave from April 7 to December 16 Mr. A. Bruce acted as Government Chemist.

In connection with the inquiry into fish canning and fish guano manufacture by the Fisheries Sub-Committee, I visited the Board of Agriculture and Fisheries in London to obtain particulars as to the possible use of trammel and drift nets in Ceylon Fisheries. I also visited the Marine Biological Laboratory at Plymouth for the same purpose. From fishermen I obtained full information re the methods of using such nets, also as to their manufacture, and general treatment. Samples of netting, cards, weights, and floats were brought out for the use of local net makers.

Inquiries were also made into the manufacture of caffeine from tea fluff as a possible local industry. It was stated that ample raw material was easily obtainable in England for the production of this drug, also that Japan had now taken up the manufacture on a large scale, so that it would be difficult to compete unless costs were very low.

In Devonshire I visited the Bieton Arboretum to inspect the growth of various types of coniferous and other trees which might be suitable for planting in the higher districts of Ceylon for future tea box wood, &c. Seeds and cuttings are being sent out. They include *Abies nobilis*, *A. pindrow*, *Picea excelsa*, *P. morinda*, *Thuja gigantea*, *Cupressus macrocarpa*, *Pinus sylvestris*, *P. strobus*, *P. insignis*, *P. excelsa*. *Pseudotsuga douglassii*, *Fagus sylvatica*, *Castanea vesca*, *Fraxinus excelsa*, *Platanus orientalis*, *Acer pseudo-platanus*, *Carya porcina*, and *C. amara*, also cuttings of *Populus serotina* and *Thujopsis dolabrata*.

The coniferous trees chosen were vigorous and rapid in growth with straight stems, the wood in each case being suitable for box making.

Seeds from Japan of trees also suitable for growing at high elevations for future tea box woods were also obtained, including *Pinus thunbergii*, *Zelkova keak*, *Cryptomeria japonica*, *Chamaecyparis obtusa*, *Abies marcesii*, *Acer trifolium*, *Abies trachyphylla*, and *Prunus serrulata*, the latter for ornamental purposes. These have been sown in nurseries in Nuwara Eliya.

The chemical work included analyses of rubber seed husks, meal, and oil. The husks are of little manurial value, containing only 1 per cent. of nitrogen. The meal contains 2.5 per cent. of nitrogen, and is only half the value of castor cake as manure. It has a nutritive ratio for feeding purposes of 1 : 4.5. The kernels contain 45 to 48 per cent. of a brown oil, similar in character to linseed oil. It dries to a hard clear transparent film in twelve days, and can be used as a substitute for linseed oil.

The palm nuts from the young palms grown at Anuradhapura Experiment Station weighed 567.5 grams per 1,000, and the ratio of husks, kernel, and shell was 1 : 1.5 : 4.5. The dry kernels contained 59.8 per cent. of oil.

An inquiry was made as to the value of palmyra palm kernels for oil extraction. Analyses showed that the fresh kernels contained only 1.4 per cent. of a resinous oil, and were of no value for this purpose. The nuts are not edible in themselves, but are germinated in heaps, the long fleshy roots produced being used as a food in Jaffna and elsewhere. Nine to ten nuts produce about one pound of edible matter consisting largely of starch and containing 95 food units.

The food values of several fodders were determined, including Senegal rice fodder, Mauritius grass, Couch grass, Guinea grass, Belatana, Dhoob grass, Undupiyali, Eltana, and Indian guinea grass. The Senegal rice grass has a spreading habit and robust growth. It contained 54.7 food units, and had a nutritive ratio of 1 : 8.9 compared with Guinea grass with 68.32 food units and a nutritive ratio of 1 : 5.9, and Mauritius grass with 82.36 food units and a ratio of 1 : 10.8.

Two distillations of camphor from Hakgala were made from "pink twig" and "green twig" varieties. The latter in Mauritius yielded no solid camphor, but an oil with a different analysis from ordinary camphor oil. 5 lb. of each were distilled, and both yielded solid camphor and some oil, the pink twig variety 1.29 per cent. of camphor and the green twig 1.24 per cent. These figures are very similar to those obtained some years previously from Hakgala trees.

Analyses of maize for moisture content gave 12 per cent., and Hickory King variety 15.3 per cent. As maize with 12 to 14 per cent. moisture will not keep, being liable to insect attack, it is essential to reduce the moisture content by some drying or other means before storing.

Samples of eight varieties of sweet potatoes grown on the Experiment Station were analysed for food values, and especially as to the starch and sugar content. They included Red Jersey, Sealy's, Joe's Sweet Potato, Pumpkin Yam, Pierson, Black Spanish, Shangi, and Jersey. The sugar content varied from 2.50 per cent. in Pierson to 4.11 per cent. in Pumpkin Yam, the starch content from 19.1 per cent. in Red Jersey to 24.48 in Joe's Sweet Potato. There is no marked variation in other respects, and the suitability of any of the above varieties for different districts would determine their selection for cropping purposes. The average sugar content is 3.58 per cent. and starch 22.21 per cent., or a total average of 25.79 per cent., which could be converted to alcohol for fuel purposes should the necessity arise.

Analyses of castor seed and poonac or cake produced locally showed the latter still contained 18.0 per cent. of oil and only 4.06 per cent. nitrogen. The question as to the advisability of treating imported and local castor poonac with volatile, non-inflammable solvents to recover this oil is worth further consideration. The extracted oil would be equally valuable for lubricating purposes, and the residual cake more valuable for manurial purposes.

Analyses were made of nine varieties of sugar cane grown on the Experiment Station, Gangarooka. These showed that the juices contained from 6.8 to 13.6 per cent. of dextrose and from 1.4 to 3 per cent. of invert sugar as dextrose. No. 1,237 was richest, and only contained 1.1 per cent. of invert sugar. Invert sugar was high in all the others, except "Sin Nombre," amounting to about one-fifth of the whole, which would have considerable effect on crystallization.

The results of the analyses of tea after spraying with lead compounds for tortrix showed only minute traces to be present, not sufficient to affect the health of consumers.

The result of the tea and rubber manuring experiments for the season are given in separate reports.

Samples of Dutch beans, which are grown in Holland in enormous quantities for winter food, were procured and distributed to several estates at different elevations for trial. The dried seeds only are used; they are soaked for twelve hours and boiled one and a half hours before being eaten.

February 22, 1920.

M. KELWAY BAMBER,
Government Agricultural Chemist.

IV.—REPORT ON THE WORK OF SCHOOL GARDENS.

Changes.—Mr. C. Driberg, the Superintendent, was on leave for two weeks from February 1, and again for 2½ months from November 22 preparatory to retirement from the Public Service. Mr. Alex. Perera, Senior Inspector of School Gardens, was appointed to act for the Superintendent, in addition to his own duties, with effect from that date. Mr. A. D. L. de Z. Jayatilleke was appointed an Additional Inspector of School Gardens, with effect from March 1. Mr. U. B. Unamboowe, Head Clerk, was transferred to the Kandy Kacheheri, with effect from June 9, and the vacancy thus caused was filled by Mr. L. B. Kapuwatte from the Head Office, Mr. E. P. Rupesinghe being considered as the Senior Clerk. Mr. C. P. Crispeyn, Assistant Foreman, Government Stock Garden, was seconded for service as Agricultural Instructor under the Ceylon Agricultural Society for a further period of one year, with effect from March 1. Mr. P. B. Keppitipola was appointed Acting Assistant Foreman, with effect from June 12, *vice* Mr. S. P. Fernando, resigned.

School Gardens.—The total number of registered Government school gardens at the end of the year stood at 389, showing an increase of 13 over the previous year; whilst the total number of gardens attached to grant-in-aid schools was 95, an increase of 20 over the previous year. Besides the 33 school gardens registered during the year, 150 others await registration for lack of funds to meet cost of equipment and inspection, and owing to the want of more inspecting officers. Financial help, however, was sought for from District School Committees, and it is very gratifying to state that substantial assistance is promised from this year. It would, therefore, be possible to equip an additional number of new school gardens. Several registered school gardens have been supplied with additional implements, yet a considerable number remain to be provided, which it is hoped to do this year. In some schools, owing to the want of good fencing, crops were destroyed by cattle, and thefts of garden produce were not infrequent. Notwithstanding these difficulties, the teachers have worked hard to keep their gardens in good condition. It is gratifying to report that they have also done all they could to increase the food supply of the Colony, while they did not lose sight of the main objects of the school garden. The following is a list of awards for the year under review, and it will be seen that Rs. 1,500 was distributed among 111 schools:—

Rupees Twenty Awards.—Hunumulla, Kiriwattuduwa, Alutgama, Horadugoda, Narandeniya, Nihiluwa, Madagalla, Itanawatta, Kankaniyamulla, Makandura, Boyagane, Tammuttegama, Gunne-Pana, Gunnepana Girls', Idamegama, Nugawela, Tennenpanguwa, Bosella, Beddewela, Pallekanda, Puwakgahawela, Balangoda Girls', and Mahamedagama.

Rupees Fifteen Awards.—Alutepola, Maligakanda, Urapola, Kesbewa, Handapangoda, Uduwara, Borawewa, Giriya, Atamune, Wadakada, Pilessa, Weuda, Watareka, Ambanpola, Ibbagamuwa, Balalla, Hunupola, Alawatugoda, Alawatugoda Girls', Mediawaka, Hindagala, Baduluwela, Opanake, Kottapola, Getiyamulla, Galkiriyagama, Ralapanawa, Galediyulwewa, Topawewa, Nagoda, Bopagoda, Talpawila, and Tissamaharama.

Rupees Ten Awards.—Danowita, Bope, Mallehewa, Kirindiwela, Green Street, Uduwa, Gowinna, Kirimetiya, Yatagala, Hungantota, Rotumba, Urubokka, Bamunugama, Dampella, MR/Kotapola, Owitigamuwa, Puhulwella, Beralapanatara, Ranna, Middeniya, Walasmulla, Warapitiya, Wariyapola, Awulegama, Monnekulama, Kuliyaipitiya, Medamulla, Dahanekgedara, Udawela, Poramadala, Bandara-koswatta, Nakkawatta, Gokarella, Kelegama, Kirigollewa, Horawupotana, Mahamankadawala, Butavatta Girls', Pallebowala, Paranagama, Paranagama Girls', K/Hanwella, Doragamuwa, Pussella, Bibilegama, Puttukulam, Malwala, Balangoda, Niwitigala, Pallekanda Girls', Beddawela Girls', Kottapola Girls', Ambepussa, and Buttala.

Rupees Five Award.—Pannala.

Certificates of merit were awarded to 80 other school gardens.

The highest award in 1918 to any single school was Rs. 25, but owing to the increase in the number of good gardens attached to registered schools, it was found necessary to reduce the amount of the awards, as the allocation for making such awards has not been proportionately increased.

A donation of Rs. 25 kindly offered by Gate Mudaliyar A. E. Rajapakse, of Negombo, for the best school garden in the Negombo District, was divided between the school gardens at Hunumulla and Alutepola, the former getting Rs. 15 and the latter Rs. 10.

Mr. M. B. Mappitigama, Ratemahatmaya, Paranakuru korale, offered a gold medal for the best kept school garden in his division, and Bosella Boys' Vernacular School was recommended for the prize.

Two prizes were also offered by the Committee of the Ibbagamuwa Agricultural Show for the best and second best school gardens in Hiriya hatpattu. Madagalla and Ibbagamuwa gardens were recommended for the first and second prizes, respectively.

A classified list of school gardens prepared by Mr. L. de Z. Jayatilleke, Inspector of School Gardens, and approved by the Director of Agriculture, is now in the hands of the Government Printer.

Central School Gardens.—Lectures and demonstrations on nature study were conducted at schools selected for the purpose. Teachers and pupils from neighbouring schools, and in some cases villagers as well, attended these lectures. On the whole, this scheme is working satisfactorily.

Home Gardens.—The number of home gardens was larger than in 1918. A sum of Rs. 700 voted by the Director of Agriculture was distributed among 103 pupils of 68 schools.

Mr. A. H. Senaratne of Badalagama estate, Wariyapola, kindly offered prizes for the best two home gardens in the Dewamedhi hatpattu, and these were won by R. K. Ranhamy of Itanawatta and A. B. Appuhamy of Awulegama. Mr. Senaratne has renewed his offer and increased the prizes to five, the first two consisting of cups, value Rs. 25 and Rs. 15, respectively, for competition among Dewamedhi and Katugampola hatpattus home gardens.

Government Stock Garden.—Additional nurseries of economic plants and food crops were opened up to meet the demand of the increasing number of registered school gardens. With the limited vote for their upkeep, I am glad to report that the work of the stock garden was maintained in as good a condition as could be expected. Surplus seeds, &c., received from 40 schools were distributed among other schools. 24,350 packets of vegetable seeds were provided for home gardens, 603 packets of flower and 2,825 packets of vegetable seeds and 32,851 ornamental and economic plants were distributed among school gardens during the year.

Apiculture.—On the suggestion of Mudaliyar Ilangakoon made at a meeting of the Ceylon Bee-keepers' Association *re* the encouragement of bee-keeping in schools, the various District School Committees were applied to for assistance. I am glad to be able to report that the response to the request for funds to provide standard hives and other bee appliances has been very encouraging.

Poultry Scheme.—The scheme for the improvement of village poultry, initiated with the help of the Hon. Dr. H. M. Fernando in 1918, received considerable attention during the year under review. Two new schools were supplied with pens of poultry in June last, *i.e.*, the Church Missionary Society schools at Padukka and Kesbewa, and fresh supplies of fowls, provided by Mr. Reginald Fernando, were given to the Roman Catholic school, Wahakotte, and the Church Missionary Society school, Teldeniya, where work is being carried on in a satisfactory manner.

Peradeniya, January 29, 1920.

ALEX. PERERA,
Acting Superintendent, Low-Country Products
and School Gardens.

V.—REPORT ON THE WORK OF BOTANIC GARDENS.

ROYAL BOTANIC GARDENS, PERADENIYA.

THE principal works, in addition to routine, included the cutting down, uprooting, and removal of numerous superfluous and overcrowding trees, especially in the arboretum and south end, thus providing larger space for more important species, whilst the trees removed furnished useful timber for general purposes.

The site of the former cooly lines has been levelled down and planted over with grass, as has also the site of the former draughtman's quarters, now included in the extension of the Coniferae section, &c.

Rampant weeds, especially the "sensitive plant" (*Mimosa pudica*), coarse grasses, &c., obtained the upper hand during the unusually wet period from September to end of December, when concentrated efforts were made to overcome these.

Mr. T. H. Parsons, Curator, Peradeniya, returned in June from war service and resumed duties. Mr. J. J. Nock, Curator, Hakgala, who assisted at Peradeniya, in addition to his own duties, during most of Mr. Parsons' absence, returned to Hakgala in March.

PLANTING OUT.

The planting out of additions to the collections in their various positions has been energetically carried on, special preparations being made by providing each plant with a large deep hole filled with good soil and manure. In the arboretum about 260 plants have been planted out in their respective orders; of these, 128 being introduced species. The conifer collection has been extended, some 44 new plants, mostly obtained from Hakgala Gardens, being planted out. The palmetum has been increased by the addition of 56 plants, 27 of these being new additions.

The fernery has been overhauled, and a number of indigenous ferns obtained and planted in vacancies.

A number of aromatic herbs has been planted in separate beds in the spice collection.

CULTIVATION, PRUNING, &C.

The nurseries, both of economics and ornamentals, have received special attention, and a general price list of the contents has been published. The economic nursery has been considerably extended and re-arranged, while the ornamental nursery has also been improved in general plan. The contents of both nurseries are in process of being replenished, and as far as practicable kept distinct. A considerable amount of overflow of stock has been planted on the river bank opposite the latter nursery.

The new palmetum, begun in 1915, is making very good progress, thanks to good preparation of the soil before planting. Most of the *Gliricidia* shade trees, no longer necessary, and of the useless old mango trees imported from Poona some thirty-five years ago have been removed.

The area under fodder grasses on the east river bank has been maintained and extended. The frequent weeding of this during the greater part of the year involved a good deal of labour. The new fodder grass referred to in last year's report as *Paspalum virgatum* (now determined as *Paspalum dilatatum*) has fully justified the favourable opinion formed of it, being in all respects a first class fodder grass. Unlike the "Mauritius" and "Guinea" grasses, it thrives at a wide range of elevation, and does not require irrigation. It is quite different in growth and general appearance from the grass commonly known as *Paspalum dilatatum* in Ceylon.

The new *Ficus elastica* row, planted in 1914, is making good progress, the trees now averaging about 20 feet in height. Some of the tallest have recently been cut back, and others shaped in order to present more uniformity.

The pruning and shaping of trees in the spice collection, arboretum, &c., and the fencing and staking of young plants received special attention.

FRUIT AND SEED PRODUCTION.

The year, on the whole, has favoured fruit and seed production. An exception has been the mangosteen crop, which has been an entire failure in some districts, as at Henaratgoda, but it has been fairly normal in others. The durian, mango, avocado pear, sapodilla, and rambutan crops have all been formal, and selected seeds of these were obtained and propagated for stock purposes.

Rubber seed was again plentiful. About 222,000 seeds were collected in Henaratgoda Garden, on which 192,600 were sold to applicants. About 20,000 seeds were collected in Peradeniya Gardens, of which, however, none were sold.

A tree of sapodilla (*Achras sapota*) fruited in Peradeniya Gardens, but almost every fruit was eaten or destroyed by bats or birds before it was nearly ripe. Seeds for stock purposes were, however, obtained from trees in the Kalutara District, where the fruit attains greater perfection than at Peradeniya.

ACCLIMATIZATION.

The plants of the oil seed trees of China (*Aleurites* spp.), referred to in last year's report, on becoming sufficiently established, were distributed as follows:—Experiment Station, Peradeniya: *Aleurites Fordii* 100 plants; Peradeniya Gardens: *A. Fordii* 2, *A. trisperma* 1; Hakgala Gardens: *A. Fordii* 18; Henaratgoda Gardens: *A. Fordii* 6, *A. trisperma* 3. The few remaining plants were issued to applicants. The plants of *A. montana* sent to Hakgala are not thriving or fit for planting out yet.

A consignment of seed of the grape fruit (*Citrus grandis*) was received from Jamaica, but they failed to germinate. A small stock has, however, been raised from local seed, and efforts are again being made to supplement this with foreign seed.

The Japanese vegetable (*Aralia cordata*) received from Japan last year has now become well established, but so far has not tempted any one to test its edible qualities; the root being woody and tough.

A fine collection of some 126 varieties of Cannas were presented by Mr. E. C. Villiers, Balangoda, to the Gardens.

Seeds of *Sequoia gigantea*, the giant coniferous tree of California, received from the Forest Department, have germinated at Hakgala Gardens, and a small stock has been raised.

Ceratopthea sesamoides, an oil seed plant from tropical Africa, has been received from Kew and become established.

NOTES OF BOTANICAL INTEREST.

The talipot palms (*Corypha umbraculifera*) in the avenue, referred to in last year's report as having flowered, are now ripening fruit.

Maximilliana regia, the handsome Cocurito palm of Brazil, introduced probably some sixty years ago, has produced seed here for the first time on record. A number of the seeds has been distributed to foreign institutions, the rest being sown here.

Treculia africana, sometimes known as the West African breadfruit, introduced and planted out in 1902, has fruited for the first time. The fruit, however, is small, and contains little that can be considered edible.

Stenocarpus sinuatus, a beautiful flowering tree introduced in 1883, has fruited for the first time, but the seeds failed to germinate. *Sterculia alata*, a large tree introduced in 1890, has also fruited for the first time.

Miconia magnifica, a small tree with very large handsome leaves, has produced fertile seed for the first time, from which a small stock has been raised.

Dimorphandra Mora, a large leguminous tree of British Guiana, has again produced a small crop of its enormous seeds, from which a limited stock has been raised.

The oil palm (*Elæis guineensis*) trees raised from seeds received from the Gold Coast in July, 1915, and planted at the Experiment Station, Anuradhapura, in 1916, have during this year produced a crop of fruit, *i.e.*, about four years from seed.

Ceroxylon andicola, the wax palm of New Grenada, flowered at Hakgala for the first time, but is now dying. It was planted here about thirty years ago and flourished until it grew up and formed a stem, when it became exposed to the effects of the south-west monsoon.

Adenium sp. (probably *A. speciosa*), a beautiful succulent plant from tropical Africa, introduced in 1912 from East Africa, flowered for the first time here.

PESTS, &c.

The introduced snail pest (*Achatina fulica*), first noticed in Ceylon in 1910 in Kalutara, is increasing rapidly in the neighbourhood, as well as in the Gardens, especially in the south end, that is the portion bordering on New Peradeniya estate and Peradeniya bridge. The abutments of the latter become literally covered with them during the wet season.

PESTS, DISEASES, &c.

The "flying foxes" (*Pteropus*) continue to be a nuisance, doing permanent injury to the tops of the handsome row of *Canarium commune* trees, which they constantly occupy in the daytime. Scaring them away by frequent shooting is the only practical remedy.

The "sensitive plant" (*Mimosa pudica*) practically superseded all other weeds, especially in the arboretum, where much of the labour force was employed to keep it in check.

The row of *Cassia nodosa*, a beautiful flowering tree, has now almost entirely succumbed to root disease, only six trees remaining, and these are badly affected.

The Oxalis weed now practically overruns Hakgala Gardens, and the effort to suppress it robs the Gardens of a great part of the labour force.

A substantially built chamber for fumigating purposes has been erected in Peradeniya Gardens.

ECONOMIC MUSEUM.

The painting of the interior of all the central show cases, begun last year, has been completed, it having been found that neither distempering nor whitewashing was satisfactory. A great improvement has thus been effected.

The timber specimens have been cut to uniform sizes and arranged systematically in general and orders, and in these alphabetically.

A collection of articles has been obtained on loan from the Kalutara Hat and Basket Association, and is shown in a special case.

A case has been put apart for named specimens of palm seeds in glass jars, and another case for a collection of ornamental seeds capable of being used as curios or in making articles of ornament or utility.

MISCELLANEOUS.

Peace celebration was observed on July 19, when sports were held in the Gardens and refreshments provided. A plant of *Tabebuia rosea*, a beautiful flowering tree, was planted as a memorial tree on the north-west side of the Great Circle by Mrs. F. A. Stockdale. Numerous inquiries were received on the question of planting memorial trees in different localities, and twenty-six plants were issued for this purpose.

The Superintendent visited the King Edward Memorial Sanatorium for Consumptives at Kandana, and submitted plans and estimates for laying out the grounds to good effect.

The Colombo Museum Garden and the Residency grounds at Ratnapura were also visited, and reports thereon submitted for their general improvement.

The fodder grass experiments at Diyatalawa, referred to in last year's report, were brought to an end in June. The results were satisfactory so far as the growth of the grasses was concerned, but the main object, viz., to provide grass for the camp, does not now exist.

The Superintendent served as a judge at the Moratuwa, Rambukkana, and Nuwara Eliya Shows; also judged up-country gardens in connection with the latter show. He also judged students' plots at the Experiment Station on two occasions, and set an examination paper for and examined the students of the School of Tropical Agriculture.

A shortage of rice was experienced from July onwards, causing a good deal of inconvenience, as well as dissatisfaction, among the staff and labour force. The rations allowed by Government have, however, so far been sufficient to keep the labour force together, but that the average quality of the latter should proportionately suffer is only to be expected.

The creation of the new post of Foreman of Government Gardens in Colombo was sanctioned by Government and took effect from October 1, Mr. D. A. W. Ranasinha being appointed to the post. With this change the establishment of a small nursery in the former Government Stock Garden and the general supervision of the Colombo Museum Garden were taken over by this Department.

I annex a report on Peradeniya Gardens by the Curator, Mr. T. H. Parsons :—

NURSERIES.

Extension of nurseries on a considerable scale has been undertaken during the latter end of the year. The economic nursery has been considerably enlarged to allow of larger quantities of economic plants to be raised, the total area for this purpose being approximately 88 yards by 74 yards. A plan of this nursery has been made, and the areas apportioned to the various economics defined.

Increased demands for ornamental plants have necessitated the re-opening of the portion below the River Drive and opposite the ornamental nursery. This should afford greater facilities for coping with such.

ARBORETUM.

A good deal of attention has been given to the systematic collections in arboretum, and some 263 plants have been put out during the year. Among the new and interesting or re-introduced plants are the following :—

<i>Aleurites Fordii.</i>	<i>Ficus euginodes.</i>
<i>Aleurites trisperma.</i>	<i>Flacourtia cataphracta.</i>
<i>Albizia procera.</i>	<i>Hernandia ovifera.</i>
<i>Antidesma daltychryanum.</i>	<i>Lonchocarpus formosianus.</i>
<i>Azertia africana.</i>	<i>Murraya amphilocarpa.</i>
<i>Chorisia insignis.</i>	<i>Ormosia calavensis.</i>
<i>Ceratonia siliqua.</i>	<i>Palaquium formosana.</i>
<i>Canarium luzonicum.</i>	<i>Semecarpus vernicifera.</i>
<i>Corynocarpus laevigata.</i>	<i>Sphæralcea umbellata.</i>
<i>Cocoloba uvifera.</i>	<i>Terminalia Brownii.</i>

PALMETUM.

All vacancies have been filled, and a number of new and re-introduced palms has been planted in the new palmetum, notably—

<i>Cocos schizophylla.</i>	<i>Livistona Maritz.</i>
<i>Calyptrogyne Swartzii.</i>	<i>Livistona subglobosa.</i>
<i>Coleospadix oninensis.</i>	<i>Nenga Wendlandiana.</i>
<i>Hyophorbe amaricaulis.</i>	<i>Phoenix Hanceana.</i>
<i>Licuala ferruginea.</i>	<i>Pinanga Kuklii.</i>
<i>Latania Loddigessii.</i>	<i>Ptychoraphis angusta.</i>

The total number of palms planted during the year, including filling of vacancies and transplanting, is 56. The cutting out of old and superfluous trees of the old arboretum order in south garden for extension of the groups continues, as these trees are established in the arboretum proper.

CONIFER COLLECTION.

A number of conifers was obtained from Hakgala and from the Seminary, Kandy, and has been planted out in the collection. A good deal of labour was necessitated in clearing and cutting down old trees in order to enlarge this area on South Garden Hill. Forty-four plants have been put out here during the past year.

FERNERY.

The collection of Ceylon indigenous ferns in the fernery has been manured and re-labelled and vacancies filled, some 40 plants having been put out and are now well established.

LABELLING.

Progress in the labelling of the garden has been made, some 1,443 brick and 205 wooden labels being put out during the year, in addition to 14 signboards painted or re-painted.

VISITORS.

The number of visitors, mostly from abroad, who signed the Visitors' Book during the year is 3,634, a considerable increase on the figures of previous years.

RAINFALL.

The rainfall for the year has been normal, 88·64 inches, against an average of 89·24 inches, and 154 rainy days equal to the average for the past thirty-six years. A lengthy drought was experienced during January, February, and the first half of March, the wettest month being November, with a rainfall of 17·63 inches for the month. The highest fall in any 24 hours measured 2·72 inches on November 27. The following is the rainfall for the year, with the average for the last thirty-six years :—

Month.	Rainfall for 1919.		Average from (1884) to 1919 inclusive.	
	Inches.	Days.	Inches.	Days.
January	1·57	4	3·60	6
February	—	—	1·63	4
March	5·79	6	4·68	7
April	6·22	14	8·50	12
May	10·00	21	6·02	12
June	7·31	18	10·90	17
July	7·60	19	8·36	18
August	3·06	10	6·01	14
September	10·47	13	6·84	16
October	7·73	13	13·69	19
November	17·63	20	10·20	16
December	9·26	16	8·81	13
Total	88·64	154	89·24	154

SALES.

4,174 plants and 692 packets of seed have been issued gratis or in exchange, and 6,168 plants and 540 packets of seed have been distributed for payment, the amount realized by sales of plants and seeds being Rs. 1,858·22, and gratis issues Rs. 866·19.

BOTANIC GARDENS, HAKGALA.

The following is a report by the Curator, Mr. J. J. Nock :—

ARBORETUM.

The arboretum below and above the path leading from the fernery to entrance gates has been thoroughly overhauled. The trees which had become too crowded have been thinned out, all stones removed where possible, and the ground suitably sloped. A collection of indigenous tree, shrubs, &c., is to be made in the triangular portion above the Cupressus avenue. All the paths leading through the arboretum have been re-made, the side drians re-paved, and the banks re-sloped. Loranthus has, as far as possible, been removed from the trees in this portion of the gardens. Plants of the following have been put out above the main path :—*Quercus glauca*, *Q. variabilis*, *Stereospermum sinicum*, *Schinus molle*, *Castanospermum australe*, *Cassia australis*, *Grevillea Banksii* var. *Forsterii*, *Acacia linearis*, *A. nerifolia*, *A. adunca*, *A. decurrens* var. *pauciglandulosa*, *A. glaucescens*, *A. saligna*, *A. lanigera*, *A. gladiiformis*.

ACACIA COLLECTION.

The ground has been sloped and all stones removed where possible. The following flowered during the year :—*Acacia Baileyana*, *A. juniperina*, *A. podalyriæfolia*, *A. longifolia*, and *A. falcata*. The following have been added to the collection :—*Acacia decurrens* var. *normalis*, *A. decurrens* var. *pauciglandulosa*, *A. gladiiformis*, *A. glaucescens*, *A. spectabilis*, *A. aneura*, *A. modesta*, *A. lanigera*, *A. nerifolia*, *A. decora*, and *A. linearis*, making in all thirty kinds in the collection. Seeds have been collected from *A. podalyriæfolia*, which flowered during July-August. None of the other species which flowered has produced any fruit.

SUCCULENT COLLECTION.

This was planted up on May 23, the following received from Peradeniya being added to the collection :—*Sansevieria Dawii*, *S. variegata*, *S. guineensis*, *S. zeylanica*, *S. cylindrica*, *Euphorbia nerifolia*, *E. Tirucalli*, *Elæophorbia arborea*, *Opuntia Dillenii*, *Cereus grandiflorus*, *C. peruvianus*, *Agave miradorensis*, *A. elongata*, *A. Morrisii*, *Eurcæa cubensis*, *F. gigantea*, *Nopalea coccinellifera*. In all seventy-six holes were prepared and planted.

FERNERY POND.

This was enlarged in September. Five small beds have been built, and the following kinds of *Nymphæa* planted :—Pink 1, yellow 2, blue 1, and a variety which has not yet flowered at Hakgala. The yellow variety (received from Mr. Campbell Dudley) has flowered well. The banks have been covered with *Selaginella Kraussiana*, and the following planted in clumps :—*Tritonia crocusæflora*, *Calla Aethiopica*, *Klugia Notoniana*, *Imantophyllum*, &c.

UPPER POND.

This has been thoroughly cleaned out and eighteen substantial rock beds built round the sides to take the place of the smaller beds, which were constantly giving trouble and had to be rebuilt frequently. The following have been planted in the new beds :—*Calla Aethiopica*, *Phormium tenax* var. *variegata*, *Phormium tenax*, *Cyperus Papyrus*, *Tritonia crocusæflora*, *Crinum giganteum*, *Typha angustifolia*, *Klugia Notoniana*, *Pennisetum macrourum*. Plants of *Nymphæa stellata* have been planted round the edges of the pond. The inlet drain has been rebuilt and put in good order.

NEW LAWN.

All the bad patches in the new lawn near the rose garden have been re-turfed. The flower beds have been re-arranged and planted with the following :—*Salvia splendens*, *Begonia* "Crimson Gem," *Impatiens Holstii*, and *Chrysanthemum anethifolium*. The long borders have been widened, manured, and planted with ornamental and flowering shrubs and herbaceous perennials, &c.

SHRUBBERIES.

Most of the shrubberies have been tidied up, and the weeding of *Oxalis* has been continued throughout the year.

COOLIES' GARDENS.

The plot in front of the lines has been suitably sloped and divided up into sections, which have been fenced with *Artemisia vulgaris*. Vegetable plants raised from seeds received from the Ceylon Agricultural Society have been distributed to the coolies, and also cuttings of sweet potato and seeds of maize from the gardens. The cattle and goat sheds, which were too close to the lines, have been removed, and the animals housed in the garden cattle shed. It is now possible to keep the surroundings of the lines in a sanitary condition.

CHINESE OIL TREE.

A plot opposite the laboratory was cleared early in October, and eighteen basket plants of *Aleurites Fordii*, raised from seed received from the Ceylon Agricultural Society, planted out and are coming on well.

CINCHONA.

Ten plants of *Cinchona succirubra* were planted out on the old Sinhalese lines site on December 10. A plot near the nursery packing shed has been cleared and eight plants of *Cinchona hybrida* put out on the same date.

CINNAMOMUM CAMPHORA.

The three-stemmed tree near upper pond was in flower during the last week in September. Specimens are being prepared for Peradeniya. Leaves and twigs from this tree and from another variety growing near the camphor plantation were sent to the Acting Government Chemist on October 6 for analysis.

CUPRESSUS FUNEBRIS (WEEPING CYPRESS).

A few more trees of this cypress have fruited for the first time, but seeds collected and sown have so far failed to germinate.

HAKEA SALIGNA.

Seeds collected from the tree below lower pond and sown in November have germinated well.

SAMBUR DEER.

A good deal of damage was done to Begonias, Impatiens, &c., in the fernery by these deer during June-July, and a stag was shot by the Curator on the night of July 11.

CUTWORM EXPERIMENTS.

Forty-eight small beds have been laid out on the top terrace of the nursery for experiments with poisoned bait. Half of the beds have been planted with vegetable seedlings, and the remainder sown with seeds. The experiments were started on October 28, after arrangements had been made with the Government Entomologist on the spot.

EXCHANGES.

Plants and seeds have been received from the following:—Royal Botanic Gardens, Kew; Botanic Gardens, Sydney; Waiata Botanic Gardens, Auckland; Mrs. C. Brett, England; and Public Gardens, Monte Video. And from the following in the Island:—Royal Botanic Gardens, Peradeniya; Mr. Campbell Dudley, Namunukula; The Secretary, Ceylon Agricultural Society; Mr. C. C. Wilson, Halgrano-ya; Mr. P. Macdonald, Nuwara Eliya; Mr. A. J. Kellow, Albion, Ambawela; The Queen's Cottage Gardens, Nuwara Eliya; Mrs. A. M. Hurst, Nuwara Eliya; Miss Tilly, Talawakele; Mrs. A. N. Robertson, Nuwara Eliya; Mrs. A. M. MacNeill, Tebuwana; Assistant Conservator of Forests, Nuwara Eliya; Mrs. W. P. Spurway, Kandapola; Mr. L. O. Gilliat, Nuwara Eliya; and Mr. John Horsfall, Bandarawela.

CLIMATE.

The number of inches of rain recorded during the year was 100·24, falling on 255 days, compared to 90·51 on 234 days for 1918. The wettest month was October, with a rainfall of 16·28 inches, and the driest February, with 0·93 inches. The highest temperature in the sun's rays was 154·1 on October 12, compared to 153·1 on May 10 of the previous year. The lowest temperature on the grass was 37·5 on March 9 compared to 36·3 on February 18 of the previous year. Exceptionally strong wind was experienced during June and July, and a considerable amount of damage was done to the trees, several Acacias, Eucalyptus, &c., being blown down.

REVENUE.

The amount realized by the sale of plants and seeds during the year was Rs. 350. The value of plants and seeds given gratis or in exchange to Government institutions, &c., was Rs. 474·80.

NUWARA ELIYA GARDENS.

The Curator, Hakgala, reports:—

GENERAL.

The path along the upper shrubbery has been lowered and put in order and the path through the new lawn gravelled. The digging out of *Sporobolus indicus*, the coarse grass which is spreading all over Nuwara Eliya, has been continued. The swamp near the tennis court has been mostly filled in, and the surrounding banks sloped and turfed. The fence round the nursery and plant sheds has been altered to make room for a path inside, and the path outside and above this plot has been altered accordingly. All the shrubberies have been overhauled and the necessary planting done.

THINNING OUT TREES.

The twelve trees of *Cupressus macrocarpa*, forming the centre of the three rows of trees near the Post Office, have been cut out, the stumps removed, and the ground levelled and turfed. The clump of *Eucalyptus robusta* on the island in the lake has been taken out and the island re-planted with Pampas Grass (*Gynerium giganteum*), *Phormium tenax* (New Zealand flax), *Pleroma macranthum*, &c. A few poor specimens of *Acacia decurrens*, *A. melanoxylon*, and *Rhododendron arboreum* have also been cut out.

REVENUE.

The amount realized by the sale of plants and seeds during the year was Rs. 46·55. The value of seeds and plants given gratis or exchange to Government institutions, &c., was Rs. 30.

HENARATGODA GARDENS.

The rubber trees produced a normal crop of seeds, some 222,000 being collected, of which 192,600 were sold to applicants. Several of the oldest trees developed root disease, and were treated in accordance with instructions from the Botanist and Mycologist. So far the famous No. 2 tree has shown no sign of disease.

The new rubber clearing (1913) was used for growing food crops, including cassava, maize, millet, &c., between the rows, the latter being 33 feet apart.

An experiment is in process for propagating Hevea by vegetative means, which, if practicable, would have an important effect on the selection of varieties. It is yet too early to report results.

A new plot of Ipecacuanha has been begun in virgin jungle soil, and under the shade of what is supposed to be original jungle. The plants in the old plot are not thriving owing probably to the close retentive nature of the soil.

A portion of the grounds has been cleared and set apart for the Education Department for the purpose of building a school and for demonstration plots. The school has been built, and the land cleared and enclosed by a wire fence.

A new nursery, surrounded by a hedge, has been made and stocked with young plants of different kinds.

The "double coconut" (*Lodoicea sechellarum*), being pollinated by pollen sent from the old staminate tree at Peradeniya, has set three more fruits. This makes nineteen fruits in all on the tree, the oldest of which, set in 1912, being now seven years old and not yet ripe, or apparently full grown.

The two wells have been cleaned and concreted, and the plant house, office, and storerooms have also been put in good repair by the Public Works Department.

The total rainfall for the year was 117.90 inches, against 86.94 inches for last year. May was the wettest month with 23 inches, and February, as usual, the driest.

THE GOVERNOR'S AND COLONIAL SECRETARY'S GARDENS.

The King's Pavilion Garden, Kandy, has been well maintained. The new flower garden has been extended, and presented an attractive appearance through the greater part of the year, the Canna beds being particularly showy. A few wild mango trees were cut down and removed, several of the banks and terraces were repaired and re-turfed, the cave and bamboo arches for climbers renewed throughout, and all the borders overhauled and manured.

The Lodge Garden has received a good deal of attention. Certain unhealthy or useless trees and old palms were cut down and removed, and some of the flower beds re-arranged. The former included a rather good specimen of *Amherstia*, which died from the pink disease.

The Queen's House Garden, Colombo, has been carried on in good order, and several improvements have been effected. A collection of *Hibiscus* in beds has been begun, and many of these already look very attractive.

The Temple Trees Garden, Colombo, has been considerably improved in general condition, new ornamental trees being planted to take the place of less desirable ones, the drive and paths reduced to uniform widths and re-gravelled, &c.

QUEEN'S COTTAGE GARDEN, NUWARA ELIYA.

The Curator, Hakgala, reports :—

A number of *Acacia melanoxylon* trees covered with *loranthus* and a few poor specimens of *Acacia decurrens* have been cut out and removed by the Forest Department at our request. Annuals in the flower garden did exceptionally well during the season.

A good deal of work has been done in the vegetable garden during the year. The paths have been re-made, and most of the plots re-arranged. The portion which has for some years lain fallow has been opened up and terraced and is now cultivated. The plant shed has been rebuilt and put in order. Club root and cutworm are still very troublesome, and it is very difficult to grow vegetables at all satisfactorily. A large plot of ground, which had been under parsley for about two years, was planted up with cauliflowers in September, but most of the plants were attacked by club root. The whole garden is infected with this disease, and it is impossible to grow any cruciferous vegetables satisfactorily, excepting perhaps cabbages, and these only when grown from cuttings.

Following instructions, green peas have been sown every three or four weeks since April, but owing to wet weather during the time the different batches were in flower, practically all the crops were failures.

CUDDESDON GARDEN, NUWARA ELIYA.

The chief work during the twelve months has been the general upkeep of the gardens and grounds.

Cupressus macrocarpa plants have been put out along the drives to take the place eventually of the present *Spiræa* hedges, which are not satisfactory, and need constant attention.

The banks and lawns have received attention, and re-turfed where necessary.

A wire-netting fence is badly needed for the vegetable garden, where damage is continually being done by hares and porcupines.

The path through the *Cryptomeria japonica* has been re-made, and a new gate and electric lamp erected at the lower end by the Public Works Department.

The grass verges along the main drive have been relaid, and the latter is now of a uniform width throughout.

The Stock Garden Nursery, Colombo, was taken over by this Department from October 1. After draining the ground and removal of superfluous growth, a number of beds were prepared and stocked with various ornamental plants sent from Peradeniya.

The Colombo Museum Garden has received attention, and certain improvements have been carried out under the immediate supervision of the Foreman of Government Gardens, Colombo.

Peradeniya, January 28, 1920.

H. F. MACMILLAN,
Superintendent of Botanic Gardens.

VI.—REPORT ON THE WORK OF THE EXPERIMENT STATION.

PERADENIYA.

TEA.

THE total output of green leaf for the year was 36,059 lb. from 11 acres. Plot 150 has been given the highest yield, 4,681 lb. in green leaf. The highest price paid for broken orange pekoe was 75 cents per lb., and the cost of manufacture has been 12½ cents per lb. Towards the end of the year it was found more profitable to sell as green leaf.

The whole area (11 acres) was manured in May and pruned in October, in accordance with the new scheme. In plot 144 the dadaps have been pruned twice, yielding 6,730 lb. of mulch. In plot 149 the dadaps have been pruned twice, yielding 9,234 lb. of mulch. In plot 150 the albizzias have been pruned once, yielding 16,965 lb. of mulch.

The old plot of coconuts ($2\frac{1}{2}$ acres) below the teas and adjoining the village was cleared and planted out with light leaf Manipuri indigenous stumps in June, half of the area being planted with dadap and the other half with *Gliricidia* stumps.

CACAO.

16,467 lb. of cured cacao has been sold during the year. The old cacao plots were manured in April, according to the scheme laid down in 1916. The operations of pruning and lopping of dadap shade were carried out through the whole area of 40 acres.

RUBBER.

New experiments on untapped trees in plots 151–154 were started in January. The whole area was divided into 6 series of 30 trees each, the method of tapping being as follows:—Half circumference one cut to left at 27 inches from the ground at an angle of $22\frac{1}{2}$ degrees, half the series being tapped every second day and half every third day.

The following experiments, which were in progress from January, 1914, were stopped by end of May on completion:—

Plot 78 C (Section 1) “Continuous” tapping: One-fourth circumference one cut to left at 15 inches tapped on alternate days. (Section 2) “Change-over tapping”: Similar as for section 1, but changed over at end of every three months.

The following experiments, which were in progress from January 1, 1918, was stopped at the end of the year:—

- (1) One-third circumference one cut to left at 3 feet tapped on alternate days.
- (2) One-third circumference with a single V at 3 feet from ground tapped on alternate days.

The following experiment, which was in progress from July, 1912, was stopped by end of August on completion:—

Plot 81 C.—One-third circumference one cut to left at 3 feet tapped daily (excepting Sundays).

The following experiments, which were in progress from June 1, 1915, were stopped by end of March, 1919, on completion:—

Plot 82 C, Group A, “Change over”: Half circumference single V at 18 inches above previous tapping tapped on alternate days for three months and then the opposite side.

Group B, “Continuous”: Half circumference single V at 18 inches above previous tapping tapped on alternate days.

The experiment in the old tea plots was stopped by the end of January.

Plots 83 A, B, D, 84 A, B, C, D, 85 D, and 86 A, and also the 2-acre plot planted in avenues were manured in April, according to their schemes. The young rubber has been catch-cropped with food crops: 2 acres with *Cajanus indicus* (dhall), 1 acre with cassava, and $5\frac{1}{4}$ acres with maize.

COCONUTS.

During the latter half of the year the 11 acres of young coconut experiments at Bandaratenna, which had perforce been somewhat neglected, were cleared, ploughed, and disc-harrowed, and the drains cleaned. The highest price obtained by auction for nuts was Rs. 69 per 1,000 nuts in August, and the lowest Rs. 44 in February.

COFFEE.

The total quantity of Robusta berries picked and sold during the year was 1,063 lb. Of Hybrid berries, the yield was 408 lb.; and of Canephora berries, the yield was 170 lb.

PADDY.

In the maha season of 1918–19 trials were made with the following varieties:—

Variety.	Calculated Yield per Acre. Bushels.
Hatial	53
Muttusamba	45 $\frac{1}{2}$
Molagusamba	43 $\frac{1}{2}$
Phillippine	26 $\frac{1}{2}$
Dr. Lock's Hatial	15 $\frac{1}{2}$

This same field of 3 acres was then prepared for the yala crop. A manurial mixture at the rate of 400 lb. per acre and yielding 6 per cent. of nitrogen and 13 per cent. of phosphoric acid was applied. $2\frac{1}{2}$ acres sown broadcast with hineti yielded 20 bushels per acre. Half acre sown broadcast with molagusamba yielded 10 bushels per acre. Both crops were very late in ripening, and this adversely affected the yields.

In order to provide material for investigation by the Economic Botanist, seed of 324 varieties, which had been collected from all over the Island, was put out and transplanted into separate strips in duplicate in November for the maha season of 1919–20. The germination and subsequent growth of a large number of the varieties has been very poor. An area of 2 acres of waste land below the reservoir has been converted into a paddy field, and plots of molagusamba, muttusamba, Dr. Lock's hatial, village hatial, Phillippine, and el-wi were transplanted in November for the first crop. In August 6 acres of the new economic section were sown broadcast with el-wi (hill paddy). This will be harvested by the end of January, and a good crop is expected.

GENERAL.

Economic Section.—Ten acres have been laid out in one-tenth acre plots separated by paths and roads, a dividing belt of two rows of rubber stumps from No. 2 tree has been established.

Sugar Cane.—Samples of each of the eleven varieties of cane have been sent to the Government Chemist for analysis.

Three and three-quarter acres were cultivated, yielding a total of 3,760½ lb. The varieties grown were Hickory King, Eureka, Potchefstroom Pearl, Chester Co Mammoth, and Ceylon Yellow.

Sorghum.—Quarter acre was cultivated, yielding a total of 87 lb. The varieties grown were Monpupu, White Sudan Dura, Dwarf Milo Dura, and Ursut Hwazana.

Fruit Plots.—A plot was planted at 16 feet by 16 feet with twenty-one grape fruit plants received from the Royal Botanic Gardens in September, 1919.

RAINFALL.

The rainfall for the year has been normal, although the number of rainy days has been excessive. There was no dry period in September. The total rainfall was 92·04 inches. Rain fell on 177 days, the wettest month being November, with 16·43 inches in twenty-one days. The greatest fall of rain during any 24 hours was 2·21 inches on September 24.

G. HARBORD,

Peradeniya, February 9, 1920.

Manager, Experiment Station, Peradeniya.

ACTING DIVISIONAL OFFICER (CENTRAL).

I took up duties as Acting Divisional Officer on August 1.

The tobacco experiments which were being carried out at the Teldeniya Trial Ground by Mr. Wilson were, on his departure from the Island in November, 1919, continued by me. The tobacco which had been harvested and cured under Mr. Wilson's supervision was brought to Gannoruwa Experiment Station for the fermentation and grading processes. The fermentation had not been completed by the end of the year.

Steps were taken to clean up the Tobacco Trial Ground at Teldeniya and prepare for further trials in 1920 by sowing a green manuring crop of green gram during the north-east monsoon.

The monthly meetings of the Food Production Committees in Kandy and Matale were attended as regularly as possible.

Visits were made to the Matale District and the Dumbara Valley to obtain a knowledge of the agricultural conditions and possibilities of the Central Province.

G. HARBORD,

Peradeniya, February 9, 1920.

Acting Divisional Officer, Central Division.

ANURADHAPURA.

STAFF.

MR. H. A. DEUTROM continued to be in charge of the station till July 31 as Acting Manager, and was subsequently appointed Manager, with effect from August 1, 1919.

RAINFALL.

2. The number of inches of rain recorded during the year was 59·07 falling in 120 days compared with 69·16 inches on 117 days for 1918. The wettest month was December, with a rainfall of 12·66 inches.

PADDY.

3. The following varieties of paddy were sown for the maha crop this year in nurseries and transplanted in the fields four to six weeks from sowing:—Molagusamba, Phillippine, Dr. Lock's hatial, and murunga. The results were not as good as last year. Most of the plots were badly attacked by the paddy fly.

A yala crop of el-wi was sown in May and harvested in September. Very encouraging results were obtained from the crop, 4 acres yielding 185½ bushels of clean paddy. This is reported to be a hardy variety, producing a long grain, which is in great favour with villagers.

Time of Planting Experiments.—These experiments were started in September at monthly intervals. This is intended to test (over a series of, say, three years) the best average season to plant, and when paddy fly and other pests may be expected to be troublesome.

Varietal Tests and Botanical Examinations.—Small plots of 105 varieties of six to seven months' paddies and 272 varieties of four to five months' paddies collected from all the Provinces in the Island have been planted in duplicate in definite labelled blocks. Of these, a disappointingly large proportion showed considerable mixture, and a few failed to germinate. The pure plots of typical plants for starting pure line cultures are being collected by the Assistant Economic Botanist, from which full description will be made and Herbarium specimens kept. It is of interest that the duration of some of these varieties, as grown at Anuradhapura, varied considerably from that recorded in their natural habitat.

Seed Distribution.—There was a very keen demand for seed paddy, and the whole of the 1919 crop, which was available for sale as seed, has been sold as such. Inquiries made among purchasers of our seed are very encouraging.

A demonstration on the economic transplanting of paddy and the diminished seed rate of paddy in the nursery was given. Several villagers and others were present, and it is of interest to note that many have adopted transplanting, with very interesting results.

FIBRES.

4. *Sisal Hemp*.—The whole of the area of unirrigable land cleared last year (24 acres) in extent has been planted with Sisal fibre. The plants were obtained from the Maha Iluppallama Experiment Station. The plants are all making headway. *Cassia auriculata* (Ranawara S.) is being planted between the rows of fibre.

Mauritius Hemp.—The plot of Mauritius hemp has been extended, and the vacancies planted up. The plants have made good growth. The interplanted dhall plants have all been uprooted and replaced with *Leucaena glauca*.

CITRUS.

5. The plots of lime raised from seed received from British Guiana have begun to blossom two years from planting. The leguminous crops intergrown are being continually dug in round the plants. The trees planted in 1914 are bearing good crops of fruits. The 6 acres planted out last year are making fair growth. The vacancies are being supplied.

COCONUTS.

6. The unirrigable plot of 4 acres have continued to make exceedingly satisfactory growth. All the trees are in a thriving and healthy condition. The weeds have been kept down as much as possible during the rains by means of ploughs, and the surface soil to the depth of 6 inches has been kept friable, loose, and free from weeds in the dry season by means of disc-harrows. The coconuts on the irrigable land are making excellent growth.

COFFEE.

7. The general appearance of the Robusta coffee trees grown under dadap, Leucaena, and Gliricidia shade is favourable. 60 lb. of berries have been picked from one-tenth of an acre at one picking.

FOOD PRODUCTS AND CURRY STUFFS.

8. The crops raised on the station this year were as follows:—Lima beans, maize, Jaffna yams, dhall, sweet potatoes, green gram, different varieties of sorghums, maniocs, arrowroot, drum sticks, chillies, onions, mustard, aniseed, cummin, coriander, ginger, and turmeric. The raisin variety of sweet potato yielded a crop of 6,550 lb. per acre of large yams. Select Millo and Dwarf Millo, the two close-headed varieties of sorghum, did best, yielding 25 and 22½ bushels of grain per acre, respectively. Chillies and onions give promise of most satisfactory crops. Turmeric did well, and gave a yield of 3,400 lb. per acre. Fresh selected seed and cuttings have been supplied to *bona fide* growers.

OIL PALMS.

9. The oil palms (*Elaeis guineensis*) planted in November, 1915, are seeding freely. Two distinct varieties are noticeable, one containing black and the other green fruit. 136 lb. of dry seed has been gathered up to date. Seed of both varieties have been planted for experimental purposes.

SUGAR CANES.

10. Eleven varieties were established this year. The yields have not yet been determined.

FRUIT SECTION.

11. Pineapples did well. The Kew and Riply Queen, weighing 10 to 15 lb. each, were readily sold on the spot. This plot has been extended. Grape fruit planted in October, 1915, fruited this year for the first time. Melons, soursofs, custard apples, mulberries, guavas, and pomegranates fruited well. Two plots of papaw have been established. Plantains did well, being free from disease.

CASTOR.

12. 3,267 lb. of castor seed was collected during the year from 10 acres. Some were sent to the Railway Department for crushing.

NEW WORKS.

13. During the year 500 new posts have been erected, and barbed wire fixed round the village boundary. The area for the new cooly lines, store, and Foreman's quarters were freed of stumps, and depressions filled in and levelled. A new water channel was made to irrigate the paddy land.

LABOUR.

14. Labour is not very satisfactory owing to the higher wages paid elsewhere and lack of proper accommodation. A gang of Sinhalese coolies were obtained from the Matale District. The health of the coolies has not been very satisfactory. Fever, dysentery, and influenza disabled half the coolies early in the year.

VISITORS.

15. Several visitors were personally conducted round by the Manager.

H. A. DEUTROM,

Anuradhapura, February 4, 1920.

Manager, Experiment Station, Anuradhapura.

VII.—REPORT ON THE WORK OF THE SCHOOL OF TROPICAL AGRICULTURE.

CONSIDERABLE changes have been made in the school since the last report was furnished. The stand-out feature was the acquisition by Government of the Irene House property for the school in October. This has given the school a sense of stability, and provided a centre for its many activities. The property covers 17½ acres, 13½ of which has been taken over by the school. There is sufficient tea, rubber, and paddy field to work on a demonstration scale; and plots will also be laid out in cacao, coffee, dry grains, and fodder grass. Plots cultivated in food crops by students at Gannoruwa have been given up and plot work located in the school grounds. This change implies a considerable saving of time, and will give early evidence in a higher standard of work and efficiency on plots.

Three members of the staff have been transferred from the school on promotion: Mr. W. P. A. Cooke to tobacco work at Jaffna; Mr. G. E. Jayatileke Hulugalle to the Experiment Station, Peradeniya, as Acting Assistant Manager; and at the close of the year Mr. H. L. van Buuren as Assistant to the Economic Botanist. Such changes are inevitable in the expansion of the Department, but the immediate loss to the school is great. These officers did the pioneer work, and to them is largely due what success has so far been achieved. Only Mr. J. C. Driberg is now left to the school of the original quartette trained for school work, and he has been placed in charge of Irene estate and of all the field work of the school. In the place of Messrs. Cooke and Hulugalle, who left at the close of the school session in September, Messrs. C. Ragunathan and C. Canagaretnam have been temporarily appointed, both of them holding the Diploma of the Poona College of Agriculture. They have shared with Mr. van Buuren the lecture work of the English and Tamil sides; while Mr. Driberg has since October been in charge of all the Sinhalese work of the school. In spite of these changes, I am able to record satisfactory progress of all work.

The Principal proceeded on leave on November 6, Mr. T. Petch acting as in 1916, and it is a pleasure to record his ready sympathy and help at all times. On November 21 the Vice-Principal, Mr. C. Drieberg, retired from the Public Service, alike an ornament to the school and an example and inspiration to its students.

The Registrar was absent from Peradeniya on Military duty in Diyatalawa for four weeks in July-August, and Messrs. Cooke and Hulugalle then shared his work, in addition to their own duties. The Registrar was also mobilized for military duty at Kandy from August 23 to the end of the year, but attended to his own duties in addition.

Messrs. N. Wickremaratne and L. S. Bertus (of the Department of Agriculture) and D. C. de Silva (of New Peradeniya estate) continued during the year to assist in co-operation, plant diseases, and estate accounts, respectively.

Regular meetings of the staff were held monthly throughout the year.

1917-1919 ENGLISH CLASS.

Of the thirty students admitted to the English two-year course in May, 1917, twenty-six qualified for the school certificate in March, 1919, four having withdrawn during 1918 from various causes as reported. On the results of the course the following awards were made :—

First Class Certificate.

Joseph Anthony Alles, Senanayake Prize for Agricultural Botany.

Quaten Charles Fernando, H. L. de Mel Prize for Agricultural Economics.

Nelson Senaratna, Salgado Gold Medal for Fieldwork, De Soysa Prize for Agriculture, Fernando Prize for Agricultural Chemistry.

John Karl van Buuren, Dias Bandaranaike Prize for Agricultural Zoology, Namasivayam Prize for Agricultural Chemistry.

Graham Vincent Wickremasekera, Rajapakse Gold Medal for best all-round student of the course, Pandittasekera Prize for Agricultural Botany, Martin Prize for Agriculture.

Second Class Certificate.

Valandy Aiappen, Arthur Bartholomew Attygalle, *Bertram George Buultjens, K. B. Valentine de Silva, D. P. Peter de Silva, Peter de Silva, Wijeyasekera Prize for Agricultural Economics; Charles Henry Jayasingha, De Silva Prize for Agricultural Zoology; J. Don Nicholas.

Pass Certificate.

Tikiri Banda Beddewala, K. Samson de Silva, S. Charles Fernando, Eric Daniel Fernando Jayasingha, *Wilfred Perera Karanagoda, H. Piyatissa Perera, Henry Pussegoda, Sinnetaimby Thurai Raja, Walter Herbert Rajapakse, George de Alwis Seneviratne, Herbert Nasadurai Solomons, Daniel Thomas Jayawickrema Weerasuriya.

Partial Certificate.

*Rasdeen Ibrahim Jainudeen.

Three of these students were offered, and accepted, Government Scholarships for further training in India : J. A. Alles, N. Senaratna, and G. V. Wickremasekera. They proceeded to Poona in June, and have been entered in the Agricultural College there.

1918-20 ENGLISH CLASS.

Of the original twenty students admitted in May, 1918, one had withdrawn as reported in 1918. Three others withdrew during 1919: one owing to the sudden death of his father, and two others on account of continued ill-health. The remaining sixteen students have continued to do good work.

1919-21 ENGLISH CLASS.

Twenty-one students were selected for admission in May, 1919. In December one of them was withdrawn. The class has been in regular session. The admissions each successive year have been gradually rising to a higher standard, and better results are anticipated from the classes now in session than have been recorded to date.

1919 COURSE FOR VERNACULAR TEACHERS.

In January, 1919, twelve Sinhalese teachers from Government village schools selected by the Director of Education were admitted for a one-year course. The instruction followed the lines of the 1918 course, and was satisfactorily completed in December, when all twelve men qualified for the School Certificate for Vernacular Teachers. The class comprised five head teachers, six assistant teachers, and one monitor who came from seven Provinces (eight districts). On the results of the course the head teachers took the first, second (tie), fourth, and twelfth places, and all prizes, the assistant teachers fourth and eighth to eleventh places, and the monitor tied for the fourth place in order of merit. The Department of Education offered three medals for competition, and the awards made were as follows :—

(Names in Order of Merit.)

V. W. S. Wijesekera, Silver Medal and Certificate.

A. J. Endoris de Silva, Bronze Medal and Certificate.

P. Martin Fernando, Bronze Medal and Certificate.

Rathenis Gunasekera,

D. M. D. B. Jayawardena,

Alvis Haputantiri,

W. B. Harmanis,

D. P. Ranaweera,

S. M. P. Perera,

J. P. G. Abeykoone,

R. P. Appuhamy,

} Certificate.

A report, with detailed results of the course, was furnished to the Director of Education in due course.

* Excluding Estate Accounts.

1919 COURSE FOR HEADMEN.

In May, 1919, fourteen Village Headmen recommended by the various Government Agents were admitted to a two-terms course (twenty-seven weeks) of instruction. Of these men, twelve were Sinhalese and two Tamils. Average age 30·5, oldest 41, youngest 20, representing all nine Provinces and twelve districts. One of these headmen had taken part in the previous Headmen's course (1917) and returned to complete his studies. The course, as in 1917, was conducted in the vernaculars, and satisfactory progress was registered. The course terminated in December, and all fourteen men qualified for the School Certificate for Headmen. Three medals were offered for competition; this number was increased to four, as the results justified the further award, the extra medal being one awarded on the 1917 course and offered by the winner for the 1919 course. A report, with detailed results of the course, was duly furnished to Government Agents and to Government. The awards made were as follows :—

(Names in Order of Merit.)

R. D. D. B. Alawattegama, Peace Officer, Matale District, Silver Medal and Certificate.	
S. Velupillai, Police Vidane, Trincomalee District, Bronze Medal and Certificate.	
I. B. Illankoon Bulupitiya, Korala, Kurunegala District, Bronze Medal and Certificate.	
K. L. Don Andarayas, Vel-Vidane, Matara District, Extra Bronze Medal and Certificate.	
Heen Banda Ekanayake, Korala, Kandy District,	} Certificate.
V. Dingirimahatmaya, Gan-Arachchi, Ratnapura District,	
P. Charles Chandarasekera, Police Vidane, Colombo District,	
R. M. Ukubanda Magandana, Arachchi, Badulla District,	
Vytilingam Kandiah, Police Vidane, Jaffna District,	
I. Charles Perera, Police Headman, Negombo District,	
A. D. Thepanis Gunawardhana, Vel-Vidane, Kalutara District,	
Mederigamaralage Kiribanda, Arachchi, Kegalla District,	
K. Punchiappu, Arachchi, Anuradhapura District,	
K. Velathai, Arachchi, Trincomalee District,	

PASSED STUDENTS.

Sixteen passed students have now been appointed to Agricultural Instructorships. The services of many others have been secured by various Food Production Committees. Four vernacular teachers, one of the 1916 class and 3 of the 1918 class, have been appointed to Agricultural Instructorships in the Kegalla District. Two passed students hold honorary office in Co-operative Credit Societies. The Department of Agriculture now employs five passed students, one of these having been sent in May for special training at the Imperial Research Institute, Pusa. One other passed student has been selected and sent for further training to Coimbatore. The majority, of course, has gone on to estates throughout the Island, and satisfactory reports of their work have been received from many employers.

HOSTELS AND SPORTS.

There were four hostels for resident students during the year, two for the English classes (thirty-seven), and one each for the teachers (twelve) and headmen (fourteen). The vernacular hostels were regularly visited and inspected, prefects being selected from among the residents and placed in charge of the remainder. The system worked satisfactorily. A serious difficulty was encountered in the case of the English hostels. The Entomologist's bungalow, occupied on loan for the past 3½ years as "Green's Hostel," had to be vacated; and the only suitable substitute for it was found in a house overlooking the Peradeniya Junction station. Being so far removed from the school, the students resident there have been put to considerable inconvenience. The need for the location of all hostels in a convenient area has been pressing, and with the purchase of the school property this has come nearer realization.

The standard of discipline and cleanliness in the school hostels has been maintained. The medical inspection of hostels was made at regular intervals by the Visiting Medical Officer, Kandy, and the health of all the students was very satisfactory.

The economic distress affected the school hostels very seriously, but all difficulties were successfully tided over.

The sports clubs of the school have been active throughout the year. Definite proposals have been formulated for distinctive club colours, and a trial order successfully placed with a London firm of sports outfitters.

MISCELLANEOUS.

On January 13 the staff and students, numbering sixty-one, left for Anuradhapura, and two days were spent studying local agriculture under tank irrigation. The essays submitted on the return to Peradeniya showed lack of proportion, but proved that the visit had been of considerable value, and that the impressions received were as vivid as they were varied. It also served to give reasonable assurance that frequent trips to various agricultural areas of the Colony would add considerably to the value of the training afforded by the school.

The staff assisted at the Rambukkana Exhibition (February), and facilities were afforded to students to visit it.

On June 21 the second annual prize giving of the school was held in the class room, Colonel T. Y. Wright, Chairman, Planters' Association, presiding. Two gold medals and ten prizes of books were distributed, with the certificates, to successful candidates of the 1917-19 course. The donors of the medals and prizes were all prominent Ceylonese agriculturists.

In July the Peace Celebrations were observed in the school in an enthusiastic manner.

The fourth number of the "Peradeniyan" was issued during the year, and maintained its reputation for interesting and readable contents.

Visits were also arranged to the Kandy Municipal market, the dairy at the Ampitiya Seminary, and the tea and rubber factories at New Peradeniya estate.

The Students' Debating Society and Students' Council have continued to do useful work.

VIII.—REPORT ON THE WORK OF CO-OPERATIVE CREDIT SOCIETIES.

THE beginning of the year was somewhat favourable, and the price of local produce rose rapidly. This had signs of regaining normal conditions of the business, but the unprecedented increase in the price of rice and other domestic necessities disorganized the tranquillity of the rural areas, and the co-operative movement again suffered. Yet the movement overcame the difficulties and continued to progress.

2. The Registrar went on furlough in November, and the Acting Director of Agriculture was appointed Registrar of Co-operative Credit Societies. Mr. P. B. Herat, Office Assistant to the Director of Agriculture, was appointed Assistant Registrar in March.

SOCIETIES.

3. Thirty new societies were registered during the year, bringing up the total to 127, which is an increase of 30 over last year. Four are industrial societies, and the rest are agricultural. The new societies are Yatiyana, Marawila, Sinhalese Young Men's Association, Morawaka, Deniyaya, Urubokka, Matara Gangaboda Pattu, Ganga Ihala korale, Wellawaya, Ransegoda, Wiyaluwa, Mahanuvara Janopakari, Matale East, Nagoda, Yatalamatta, Magura Palata, Warakagoda Palata, Welgam Palata, Migahatenne, Kewitiyagala, Galkissa Peruwa, Bellapitiya Palata, Uduwara Palata, Kumbukke Palata, Alutgama Agricultural, Matale South, Haris Pattu, Yalegala Palata, Padukka, and Uruwela Peruwa.

MEMBERS.

4. The membership shows an increase of 4,615, or a total of 15,160. This is against a total of 10,545 last year.

CAPITAL.

5. The paid-up capital of all the societies was increased to Rs. 86,721, showing an increase of Rs. 37,364·71 against last year. This increase is largely due to the establishment of new societies.

LOANS.

6. At the end of last year a sum of Rs. 59,244·76 was outstanding, and Rs. 75,347·47 were given on loan to members this year, and Rs. 68,707·34 were recovered, and a balance of Rs. 81,870·50 was outstanding.

RESERVE FUND.

7. The reserve fund as it stood at the end of last co-operative year March 31, 1919, namely, Rs. 11,243·17, shows an increase of Rs. 4,568·17 over last year.

DEPOSITS.

8. The total amount of deposits by members in the societies was Rs. 7,415·01.

PROGRESS OF SOCIETIES IN THE PROVINCES.

9. *Western Province.*—The number of societies increased to 42, the Kalutara District leading in the number of societies and in the volume of business done. New societies were started in Pasdun korale east, Rayigam korale, Hewagam korale, and the Siyane korale west. The areas of operations of the societies of Rayigam korale were reduced and new societies were formed. Similarly, the area of operation of the Udugaha Meda Depattuwa Society in the Hewagam korale was reduced, and a new society was formed at Padukka. The progress is satisfactory.

10. *Central Province.*—There are sixteen societies in the Province, an increase of six over last year. Four of the new societies have started work earnestly, and the remaining two have not yet begun work. The condition of the most of the old societies is far from satisfactory.

11. *Southern Province.*—Eight new societies were registered during the year. The total number of societies is twenty-eight. Of the eight new societies, six from Matara and two from Galle Districts. All, except one society, have made satisfactory progress.

12. *Northern Province.*—The number of societies remains the same, viz, sixteen. Several societies received loans from Government during the year. There were no societies in the Mullaitivu District, and it is pleasing to note that a beginning has already been made to organize societies in the district.

13. *North-Western Province.*—There are four societies in the Province, one each in the Kurunegala and Puttalam Districts and two in the Chilaw District. The latter two have already started work.

14. *Eastern Province.*—No increase of societies was evident in this Province. Of the six societies, the Trincomalee District Society is showing some progress.

15. *North-Central Province.*—The only society in this Province, viz., Anuradhapura Society, has not transacted business, and the Secretary has resigned. The resuscitation of the society and the inauguration of other societies are receiving the attention of the Government Agent and others.

16. *Province of Uva.*—Two new societies were registered during the year, raising the total number of societies to seven. All are working societies, but the Uva Society requires re-organization.

17. *Province of Sabaragamuwa.*—This Province does not show any increase in the number of societies, but it is showing a renewed interest in the matter of co-operation.

INSPECTION AND AUDIT.

18. The Registrar, Secretary, and the Inspector attended to the annual inspection of societies and auditing of accounts. The Assistant Registrar accompanied the Registrar in his visit of inspection in the Western Province.

FINANCIAL ASSISTANCE BY GOVERNMENT.

19. Four societies received loans from Government during the year, and the number of societies which have received loans from Government is eighteen. The total amount lent to them was Rs. 13,935, and the amount refunded was Rs. 1,769. The American Mission Agents' Society refunded the loan taken in the previous year, and received a fresh loan this year. Rs. 12,166 were outstanding at the end of this year.

AGRICULTURAL SHOWS AND GARDEN COMPETITIONS.

20. The Galboda and Kinigoda Korales Society held an Agricultural and Industrial Show in February, which was opened by His Excellency the Governor. This was the second show held under the auspices of this society, and the Godakaha Palata Society held a Village Show in March. Members of three societies took part in the garden competitions, and received three money prizes awarded by the Ceylon Agricultural Society.

SUPPLY OF MANURE, IMPLEMENTS, AND SEEDS.

21. The supply of manure through societies is highly appreciated by the members of the societies. As a result the supply is increasing gradually. In the year under review 328 tons 16 cwt. of bone manure, costing Rs. 37,074.53, were supplied through societies. The price of manure has again risen, and the price at the end of the year was Rs. 120 per ton. The price at the beginning of 1918 was Rs. 70 per ton. The increase in the supply over last year is exactly double, and the value has been increased by Rs. 21,000.

22. Ninety-eight societies have been supplied with over 2,000 packets of vegetable seeds for distribution among members.

23. Several societies have purchased on credit agricultural implements and barbed wire and sold them to members at cost price.

CO-OPERATIVE EDUCATION.

24. The Sinhalese and Tamil magazines of the Ceylon Agricultural Society containing articles on co-operation were continued to be issued free of cost to societies. The usual courses of lectures on co-operation were given to the students of the school of Tropical Agriculture.

MISCELLANEOUS.

25. A Conference of Co-operative Credit Societies was held at the Council Chamber on July 2, and was opened by His Excellency the Governor, who presided at the morning session and took part in the discussions. Some very important subjects conducive to the progress of the movement were discussed. Representative delegates of 104 societies and a number of distinguished visitors were present. At the evening session of the Conference the Registrar presided. The following are the important subjects discussed:—

- (1) Incorporation of Mutual Provident Associations.
- (2) Penalization or registration of chittu clubs.
- (3) Provision of facilities for the collection of debts due to Co-operative Credit Societies.
- (4) Exemption of postage on official correspondence by societies.
- (5) Reduction of railway freightage on manures and other supplies.
- (6) Extension of demurrage periods on manures supplied to societies through Railway.
- (7) Establishment of a Central Co-operative Supply Society.
- (8) Lease of Crown lands to societies for food production.
- (9) Extension of co-operation to industries.
- (10) Provision of training classes to co-operative workers.
- (11) Amendments of the Co-operative Credit Ordinance, No. 7 of 1911.
- (12) Amendments of rules and provision of new rules.
- (13) Utilization of reserve fund.
- (14) Formation of unions, central banks, &c.
- (15) Working capital for Co-operative Societies.
- (16) Publication of reports of the Registrar, &c., in the vernacular languages.

26. An event of importance in connection with the co-operative movement in the Colony was the visit paid by His Excellency the Governor to Ratnapura Co-operative Credit Society. His Excellency presided at the annual general meeting and delivered an interesting address. This was published in leaflet form and circulated to all societies.

27. As a rule, every rural society has taken an interest in agricultural work, and has done its utmost to bring larger areas under food crops. The leaflets published by the Department on the production of food were circulated to societies, and were read at the meetings and distributed to their members. These were of use to them in their endeavours to produce more food.

N. WICKREMARATNE,

Peradeniya, February 3, 1920.

Secretary, Board of Control, Co-operative Credit Societies.